



United States Department of the Interior

BUREAU OF LAND MANAGEMENT
MEDFORD DISTRICT OFFICE
3040 Biddle Road
Medford, Oregon 97504
email address: or110mb@or.blm.gov



IN REPLY REFER TO:
1792(OR116)

JUL 11 2008

Dear Interested Public:

The enclosed *Environmental Assessment* (EA) for the Windy Soda Salvage project is available for public review. The public review period, advertised in the Medford's *Mail Tribune* newspaper, ends on July 28, 2008.

The Bureau of Land Management (BLM) proposes to salvage approximately 413 acres of BLM-administered lands in the South Fork Little Butte Creek Watershed. The Windy Soda Project would salvage trees that were wind thrown (trees uprooted or snapped off) during a high wind event in early January, 2008. Standing green trees are not slated for removal unless they were partially uprooted during the storm and/or are deemed an immediate safety hazard tree. Seedlings would be planted as needed to bring tree stocking to recommended levels for sustainable timber production. The proposed salvage project would be accomplished with one or more commercial timber sale(s). Fuels remaining after the timber salvage would be treated. Existing roads would be utilized for tree removal. No new road construction is proposed. Roads and drainage ditches would be cleaned of debris following salvage operations. The legal description for the proposed Windy Soda project area is: T. 37 S., R. 2 E., in sections 24 and 25; T. 37 S., R. 3 E., in sections 18, 19, 29, 30, 31, and 32; W.M., Jackson County Oregon.

We welcome your comments on the content of the EA. We are particularly interested in comments that address one or more of the following: (1) new information that would affect the analysis, (2) information or evidence of flawed or incomplete analysis; (3) BLM's determination that there are no significant impacts associated with the proposed action, and (4) alternatives to the Proposed Action that would respond to purpose and need. Specific comments are the most useful. **Comments are due by 4:30 PM, July 28, 2008.**

Before including your address, telephone number, email address, or other personal identifying information in your comment, be advised that your entire comment, including your personal identifying information, may be made publicly available at any time. While you can ask us in your comment to withhold your personal identifying information from public review, we cannot guarantee that we will be able to do so.

All comments should be made in writing and mailed or delivered to Kristi Mastrofina, Ashland Resource Area, 3040 Biddle Road, Medford, OR 97504. Further information on this proposed project is available at the Medford District Office, 3040 Biddle Road, Medford, Oregon 97504 or by calling the Ashland Resource Area Planning Department. Contact Kristi Mastrofina at (541) 618-2497 or Ed Reilly at (541)-618-2497.

Sincerely,

John Gerritsma
Field Manager
Ashland Resource Area

Enclosure

July 15, 2008

Errata #1

For

2008 Windy Soda Salvage Project Environmental Assessment. Medford District Bureau of Land Management. Medford, OR.

Page 3-30.

The sentence that begins “Schowater 2005...” is incorrect. Change Schowater to Schowalter.

Page 2-1.

The sentence beginning “An estimated 145 acres would” is incorrect. Change 145 to 146.

Page 3-32.

The sentence beginning “Of the 413 acres, small diameter slash (tops and limbs 1-3 inch diameter) created from blow down trees would be hand-piled and burned on 145 acres” is incorrect. Change 145 to 146.

References

The following references, cited in the Windy Soda Salvage Project Environmental Assessment, were not included in the references section and have been added:

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- Beschta, Robert, nd. *Cumulative Effects of Forest Practices in Oregon prepared for the Oregon Department of Forestry* available at <http://www.cof.orst.edu/cof/teach/for341/Cumulative%20Effects%20of%20Forestry%20on%20Soils/CHAPT6Soils.htm>
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- Childs, S.W., S.P. Shade, D.W.R. Miles, E. Shepard, and HA Froehlich. 1989. *Soil physical properties: importance to long-term forest productivity*. pp. 53-66. In: D.A Perry, R. Meurisse, B. Thomas, R. Miller, J. Boyle, J.Means, C.R. Perry, and R.F.

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Graham, Russell T.; McCaffrey, Sarah; Jain, Theresa B. (tech. eds.) 2004. *Science basis for changing forest structure to modify wildfire behavior and severity*. Gen. Tech. Rep. RMRS-GTR-120. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station. 43 p.

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Smith, Bill. Personal communications. 2008. Protection Supervisor, Oregon Department of Forestry, Southwest Oregon District.

U. S. Department of Agriculture. Forest Service. 2002. *Biological Evaluation of the Spruce Beetle and Mountain Pine Beetle for the Brush Creek-Hayden Ranger District, Medicine Bow—Routt National Forests 2000 and 2001*. Biological Evaluation R2-02-07. Denver, CO.

ENVIRONMENTAL ASSESSMENT

for the

WINDY SODA SALVAGE PROJECT

**U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MEDFORD DISTRICT
ASHLAND RESOURCE AREA**

EA No. OR-116-08-04

**UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
MEDFORD DISTRICT**

CHAPTER 1: PURPOSE AND NEED FOR THE PROPOSED ACTION

A. INTRODUCTION

The Bureau of Land Management (BLM), Ashland Resource Area, proposes to implement the Windy Soda Salvage Project, a forest management project, designed to implement the Bureau of Land Management's Medford District Resource Management Plan (RMP) (USDI 1995). The management objectives for the project area are described below under Section C, 1, Conformance with Land Use Plans.

This Environmental Assessment (EA) documents the environmental analysis conducted to estimate the site-specific effects on the human environment that may result from the implementation of the Windy Soda proposal. The analysis documented in this EA will provide the BLM authorized officer, the Ashland Resource Area Field Manager, with current information to aid in the decision-making process. This EA complies with the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act (NEPA; 40 CFR Parts 1500-1508) and the Department of the Interior's manual guidance on the National Environmental Policy Act of 1969 (516 DM 1-7).

B. WHAT IS BLM PROPOSING & WHY

In early January 2008, a series of winter storms hit the West Coast. The storms brought strong winds and heavy rain and snow to Southern Oregon and Northern California. Wind gusts up to 60 miles per hour (MPH) downed power lines and uprooted trees throughout the Rogue Valley. The National Weather Service in Medford Oregon posted high wind warnings for the southern Oregon Cascades for January 4, 2008 "winds will increase to 40 to 60 MPH with gusts to around 90 MPH...Sustained wind speeds of at least 40 MPH or gusts of 58 MPH or more can lead to property damage." Patches of green trees were blown down or damaged within forest stands across the Butte Falls and Ashland Resource Areas. The Windy Soda project area was the area most impacted by the wind event(s) on the Ashland Resource Area.

The Windy Soda Salvage Project is located on Matrix lands, and subject to the requirements of one the Oregon and California Railroad and Coos Bay Wagon Road Grant Lands Act of 1937 (O&C Act), for which sustainable timber production is the primary purpose. Matrix lands, or General Forest Management Areas (GFMA), are further broken out into the northern and southern GFMA's. The Windy Soda Salvage Project area is located on Matrix land in Southern General Forest Management Area. The RMP designates these lands to be managed for commodity production to "assure a moderately high level of sustained timber productivity" (RMP, Appendix E, p. 192). The Timber Resource objectives for Matrix lands guide the agency to provide a sustainable supply of timber and to provide for the salvage harvest of timber killed or damaged by wind (RMP, p. 72). Timber products produced from this area would be sold in support of the District's Allowable Sale Quantity declared in the RMP (RMP p. 73). The Windy Soda Salvage Project is proposed to meet Timber Resource Objectives identified by the Medford District RMP for Matrix lands. The RMP also requires that projects are designed to be economically feasible (RMP p. 80).

The Windy Soda project occurs on approximately 413 acres of BLM-administered lands in the South Fork Little Butte Creek Watershed (Map 2-1). The Windy Soda Project would salvage trees that were windthrown (trees uprooted or snapped off) during a wind event in early January 2008. Standing green trees are not slated for removal unless they were partially uprooted during the storm and/or are deemed

immediate safety hazard trees. Seedlings would be planted as needed to bring tree stocking to recommended levels for sustainable timber production.

The proposed salvage project would be accomplished with one or more commercial timber sale(s). Fuels remaining after the timber salvage would be cut, hand-piled and burned, lopped and scattered, or underburned. Existing roads would be utilized for tree removal. Roads and drainage ditches would be cleaned of debris remaining from the winter storm and subsequent salvage project. A more detailed description of BLM's proposed action is included in Chapter 2, Alternatives.

The legal description for the proposed Windy Soda project area is: T. 37 S., R. 2 E., in sections 24 and 25; T. 37 S., R. 3 E., in sections 18, 19, 29, 30, 31, and 32; W.M., Jackson County Oregon (Map 2-1).

The **project area** is defined as the area where action is proposed. The **analysis area** is the area used to assess the effects to resources affected by the project proposal. The analysis area varies by resource.

C. SCOPING AND ISSUES

Scoping is the name for the process used to determine the scope of the environmental analysis to be conducted. It is used early in the NEPA process to identify (1) the issues to be addressed, (2) the depth of the analysis, and (3) potential environmental impacts of the proposed action.

Scoping has occurred for the Windy Soda Project. The Windy Soda project appeared in the Ashland Resource Area's Schedule of Proposed Actions published in Medford's Messenger (BLM's quarterly newsletter) beginning in the spring 2008 edition. Letters were sent May 28, 2008 to interested organizations, community groups, other agencies, tribes, adjacent land owners, and other individuals. The letter described the purpose and need for the proposed action and included a detailed description and map of the activities proposed. Many letters and comments were received by the BLM in response to this public outreach.

An interdisciplinary (ID) team of resource specialists reviewed the proposal and all pertinent information, including public input received, and identified relevant issues to be addressed during the environmental analysis. The following questions and discussion frame the issues determined to be relevant to the Windy Soda proposed action. These questions/issues will be used to identify required project design features and to focus the analysis of environmental effects that may result from the implementation of the Windy Soda proposed action or alternative:

1. What is the potential for impacts to soils and site productivity?

Ground-based yarding may have impacts on soils and site productivity from compaction and displacement.

2. What is the potential for impacts to water resources?

Any Increases in soil compaction from proposed logging activities and fuels treatments may affect streamflows.

The Windy Soda project is located in the Soda Creek and Deer Creek drainages. Soda Creek and Deer Creek are listed as 303(d) water quality limited streams; Soda Creek is listed for sediment and temperature and Deer Creek is listed for sediment. Non-point source pollution (sedimentation) from management activities has the potential to degrade the aquatic ecosystem (e.g., reduced water quality for salmon, steelhead, and trout).

3. What is the potential for impacts to aquatic habitat and fish?

The Windy Soda Salvage project occurs in the Soda and Deer Creek drainages. Both streams support fish and have stream reaches designated as Coho Critical Habitat and Essential Fish Habitat under the Endangered Species and Magnuson Stevenson Fisheries acts.

4. What is the applicability of the studies *Biogeochemical Consequences of Wind and Salvage-Logging Disturbances in a Spruce-Fir Forest Ecosystem* (del Rio and Wessman, unpublished) and *Changes in Understory Composition Following Catastrophic Windthrow and Salvage Logging in a Subalpine Forest Ecosystem* (del Rio 2006) to the Windy Soda Salvage Project?

Commenters submitted studies by del Rio and Wessman (unpublished), *Biogeochemical Consequences of Wind and Salvage-Logging Disturbances in a Spruce-Fir Forest Ecosystem* and *Changes in Understory Composition Following Catastrophic Windthrow and Salvage Logging in a Subalpine Forest Ecosystem* (del Rio 2006) and suggested that BLM analyze the Windy Soda Salvage project in context of their findings.

5. How does timber salvage, including the timing of salvage, contribute to the potential for increased bark beetle activity in the project and surrounding area?

In western Oregon, bark beetles thrive on fresh windthrow, which is their food source. Available food source is the ultimate regulator of bark beetle populations. When food sources are high, beetle populations likewise build up to high levels. When populations build up they can attack and readily kill standing trees causing epidemics.

6. What is the potential for increasing the fire hazard?

Young tree plantations resulting from the reforestation of areas affected by blowdown events contribute to an increase fire hazard as the trees grow in height and width to form more continuous fuels.

Fine fuels (tree branches, twigs, and needles) from the blowdown trees, if left untreated, could increase fire hazard. Large fuels created by blowdown event can contribute to increased fire severity within the areas affected by blowdown.

Some commenters suggested that large down trees with a large surface to volume ratio burn slower and can actually dampen fire behavior depending on their spatial arrangement and fuel moisture levels; therefore, removing blowdown trees would increase fire hazard.

7. How does the timing of timber salvage affect the quantity and value of the timber removed?

Delays in timber salvage can result in lost volume and values. Wood decay rates vary by species, log size, and site conditions. Average volume losses are estimated to be about 10 percent after 2 years and 25 percent after four years. Log grade and thus value are also affected by the timing of salvage. Ponderosa pine is affected by a blue stain fungus, which begins to devalue wood value within the first year. Wood checks and splits also result in the devaluation of wood.

8. What is the potential for impacts to wildlife?

As a component of wildlife habitat, downed wood serves as sites for breeding, feeding, and sheltering for many wildlife species. The removal of blowdown timber could affect habitat for some species in the project area.

9. What is the potential for effects to botanical resources?

The yarding and dragging of logs causes soil disturbance creating conditions conducive for weed infestations.

Timber yarding activities has the potential to increase the area compacted, which could adversely effects habitats for native plants and fungi.

D. DECISION FRAMEWORK

This Environmental Assessment will provide the information needed for the authorized officer, the Ashland Resource Area Field Manager, to select a course of action to be implemented for the Windy Soda Project. The Ashland Resource Area Field Manager must decide whether to implement the Proposed Action as designed or whether to select the no-action alternative. In choosing an alternative, the Field Manager will consider how well the alternative responds to the identified project need, along with the relative merits and consequences of each alternative related to the relevant issues.

The forthcoming decision record will document the authorized officer's rationale for selecting a course of action based on the effects documented in the EA, and the extent to which each alternative:

1. Contributes towards the Districts Allowable Sale Quantity.

The Windy Soda Project is located on BLM-administered lands allocated to produce a sustainable supply of timber. Timber products removed to meet Timber Resource Objectives (ROD/RMP p.17, 72-73) would contribute towards the District's Allowable Sale Quantity.

2. Addresses the costs for managing the lands in the project area (economically practical).

The RMP directs that all silvicultural systems applied in the project area be economically practical (RMP p. 180; RMP/EIS p. 2-62). The Windy Soda Project should be designed to ensure the economic efficiency of salvaging timber to meet timber management objectives of the RMP.

3. Meets the BLM's obligation to protect resources consistent with existing laws, policy, and the direction of the 1995 Medford District Resource Management Plan.

The relevant issues listed above (Section C, Scoping and Issues) provide the necessary framework for assessing the merits and the consequences to the physical, biological, human environment of implementing the Windy Soda proposed action or alternative (No-Action). Section E, Legal Issues (below), provides the context for determining the project's consistency and conformance with land use plans, agency policy, and existing laws.

The decision will also include a determination of whether or not the impacts of the proposed action are significant to the human environment. If the impacts are determined to be within those impacts disclosed in the Medford District Resource Management Plan/EIS (USDI 1995) and the Northwest Forest Plan (USDA/USDI 1994), or otherwise determined to be insignificant, a Finding of No Significant Impact (FONSI) can be issued and a decision implemented. If this EA determines that the significance of impacts are unknown or greater than those previously analyzed and disclosed in the RMP/EIS and the NWFP SEIS, then a project specific EIS must be prepared.

E. LEGAL REQUIREMENTS

1. Conformance with Land Use Plans

The proposed Windy Soda Project is designed to conform with and is tiered to the *Medford District Record of Decision and Resource Management Plan* (RMP) as amended by the *Record of Decision To*

Remove the Survey and Manage Mitigation Measure Standards and Guidelines from the Bureau of Land Management Resource Management Plans Within the Range of the Northern Spotted Owl (USDI 2007). The 1995 Medford District Resource Management Plan incorporated the *Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl and the Standards and Guidelines for Management of Habitat for Late-Successional and Old-Growth Forest Related Species Within the Range of the Northern Spotted Owl* (Northwest Forest Plan) (USDA and USDI 1994).

The Windy Soda Project is located within a Tier 1 Key Watershed (RMP p. 23 and RMP Map 3). Key Watersheds, a component of the Aquatic Conservation Strategy, are designated for the conservation of at-risk anadromous salmonids, bull trout, and resident fish species. Management Actions/Direction of the Medford District RMP requires that watershed analysis is conducted prior to management activities; a watershed analysis was conducted in 1997. Management Actions/Direction also requires that there be no net increase in the amount of roads in key watersheds. There are no new roads proposed for the Windy Soda project.

2. Statutes and Regulations

The proposed action is in conformance with the direction given for the management of public lands in the Medford District by the Oregon and California Lands Act of 1937 (O&C Act), Federal Land Policy and Management Act of 1976 (FLPMA), National Environmental Policy Act (NEPA) of 1969, the Endangered Species Act (ESA) of 1973, the Clean Water Act of 1987, Safe Drinking Water Act of 1974 (as amended 1986 and 1996), Clean Air Act of 1990, and the Archaeological Resources Protection Act of 1979.

a. Water Quality Restoration Plan for the North and South Forks Little Butte Key Watershed

The BLM is recognized by Oregon Department of Environmental (DEQ) as a Designated Management Agency for implementing the Clean Water Act on BLM-administered lands in Oregon. The BLM has signed a Memorandum of Agreement (MOA) with the DEQ that defines the process by which the BLM will cooperatively meet State and Federal water quality rules and regulations.

To comply with the BLM-DEQ Memorandum of Agreement, the BLM completed the Water Quality Restoration Plan for the North and South Forks Little Butte Key Watershed. This document describes how the Bureau of Land Management (BLM) will meet Oregon water quality standards for 303(d) listed streams on BLM-administered lands within the North and South Forks Little Butte Creek Key Watershed. The organization of this Water Quality Restoration Plan is designed to be consistent with the DEQ's Rogue Basin Water Quality Management Plan (WQMP) when it is completed, and contains information that will support the Oregon Department of Environmental Quality's (DEQ) development of the Rogue Basin Total Maximum Daily Load (TMDL). A TMDL defines the amount of pollution that can be present in the waterbody without causing water quality standards to be violated. DEQ anticipates the establishment of the Rogue Basin TMDL by late 2008.

A WQMP is developed to describe a strategy for reducing water pollution to the level of the load allocations and waste load allocations prescribed in the TMDL. The approach is designed to restore the water quality and result in compliance with the water quality standards, thus protecting the designated beneficial uses of waters of the state. Through implementation of the RMP, Aquatic Conservation Strategy, and Best Management Practices, the proposed action and alternatives are designed to attain the recovery goals for listed streams on federal lands in the North and South Forks Little Butte Key Watershed. Recovery goals are identified in the *Water Quality Restoration Plan for the North and South Forks Little Butte Key Watershed* (USDI BLM 2006). The proposed action draws upon the passive restoration management actions recommended for achieving federal recovery goals. Following the WQRP for the North Fork and South Forks Little Butte Creek Key Watershed assures that BLM's management in the interim, between listing of the stream as water quality limited and the establishment of TMDL for the stream, will not violate the Clean Water Act.

I. INTRODUCTION

This chapter describes the Proposed Action Alternative developed by the ID Team to achieve the objectives identified in the Purpose and Need statement in Chapter 1. In addition, a “No Action” Alternative is presented to form a base line for analysis. Project design features (PDFs), which apply the Best Management Practices as described in Appendix D of the RMP, are an essential part of the Proposed Action. The PDFs are included as features of the action alternatives in the analysis of anticipated environmental impacts.

II. ALTERNATIVES ANALYZED IN DETAIL

A. Alternative 1 - No Action Alternative

The No-Action Alternative describes a baseline against which the effects of the action alternative can be compared. This alternative describes the existing conditions and the continuing trends, given the effects of other present actions and reasonably foreseeable actions identified, for the time periods relevant to the resource issues of concern. Under the No-Action Alternative, the Windy Soda Project would not be implemented; there would be no commercial removal of wind-thrown trees, no roads would maintained, and there would be no hazardous fuels reduction through this proposed action. The analysis of this No-Action Alternative answers the question: What would occur to the resources of concern, if the proposed action does not take place?

The decision maker does not need to make a specific decision to select the “No-Action” Alternative. If that is the choice, the proposed action would simply be dropped and the decision process aborted. Future resource management in this area would not be precluded and could be analyzed under a subsequent NEPA document.

B. The Proposed Action Alternative

This section describes the Proposed Action in detail. The Proposed Action is described in two sections. Section 1, is the Summary of the Proposed Action, by treatment types and treatment methods. Section 2, Project Design Features, describes procedures included as part of the proposed action that are required by the RMP for protecting resources.

1. Summary of the Proposed Action

Alternative 2, the Proposed Action, was developed to achieve the objectives described in Chapter 1, Purpose and Need statement. The Proposed Action would remove windthrown trees on approximately 413 acres of BLM-administered lands in the Soda Creek and Deer Creek drainages. No green trees are targeted for removal unless they are partially blown over (roots sprung from the soil) and/or identified as a safety hazard tree. An estimated 111 acres would be salvaged using cable yarding, about 265 acres would be salvaged using tractor yarding methods, and 37 acres would be salvaged using helicopter yarding. Windthrown trees are not distributed evenly across the units identified on Map 2-1; BLM estimates that only about 50 to 70 percent of the acreage identified will be actually affected during salvage operations. Unit specific information is displayed in Table 2-1 and Map 2-1.

Fuels reduction would take place following yarding operations. Fuels would be treated primarily by handpiling and burning or lopping and scattering. An estimated 145 acres would be handpiled and burned. Slash would be lopped and scattered on an estimated 188 to 268 acres. Blowdown trees are not uniformly distributed in the project units, treatment will occur in areas where the slash is concentrated due to blowdown. Post salvage evaluations would determine the extent and method (hand pile and burn, lop and scatter, or underburn) of treatments to best meet fuels reduction needs and economic objectives. Underburning may be utilized as a fuels treatment method.

Map 2-1. Windy Soda Project Units (Alternative 2)

Table 2-1. Alternative 2 – Salvage Units by Yarding System and Fuels Treatment¹

Unit Descriptor	Est Acres	Yarding System	Fuels Treatment
18-1	2	CR	Lop & Scatter
19-1	2	CR	Lop & Scatter
19-2	1	PS	Lop & Scatter
19-3	1	PS	Lop & Scatter
19-4	18	PS	Lop & Scatter
19-5	6	PS	Lop & Scatter
19-6	17	CR	Lop & Scatter
19-7	6	PS	Lop & Scatter
19-8	18	H	Lop & Scatter
19-9	19	H	Lop & Scatter
29-1	9	CR	Lop & Scatter
29-2	15	CR	Lop & Scatter
30-1	20	PS	Lop & Scatter
30-2	15	PS	Handpile & burn
30-3	32	CR	Handpile & burn
30-4	5	PS	Lop & Scatter
30-5	13	PS	Lop & Scatter
31-1	23	PS	Lop & Scatter
31-2	9	CR	Lop & Scatter
31-3	68	CR	Handpile & burn
31-4	2	CR	Lop & Scatter
31-5	37	CR	Lop & Scatter
31-6	24	CR	Lop & Scatter
31-7	31	CR	Handpile & burn
31-8	17	CR	Lop & Scatter
31-9	3	PS	Lop & Scatter
Total	413		
Yarding Systems			
CR - Crawler Tractor			
PS – Cable			
H - Helicopter			

¹ Unit acres reported in this table are based on Geographic Information System (GIS) data and rounded to nearest whole acre. Unit acres may differ from those reported in individual timber sale contracts/prospectuses due to differences in electronic mapping software and slight variations in actual on-the-ground layout. Total acres may vary slightly from other tables displayed throughout the analysis file due to methods used for rounding data outputs. The acreage differences that may be detected are within less than (+/-) 5% of the total project acreage analyzed and would not contribute to any measurable differences in effects reported in this EA.

a. Yarding Methods – Windthrown trees designated for removal would be moved to landing areas using a combination of skyline cable, tractor, and helicopter yarding methods.

- (1) **Skyline Yarding:** drags trees with one end suspended, and one end on the ground, up the slope to a landing area on or near a road. This requires narrow skyline corridors about every 200 feet, and parallel to each other, through the treatment unit to operate the skyline cable. Corridors are about 9 to 15 feet wide, depending on the size of trees to be removed and the terrain. Existing corridors would be utilized to the extent practical. Any new corridors would be pre-located and approved by the BLM. Trees removed are end-lined (dragged) to the corridor.
- (2) **Tractor Yarding:** utilizes tractors to drag trees to landing locations. Tractor yarding only occurs on lands with less than 35 percent slope. This method requires narrow skid trails (about 9 to 12 feet wide). Skid trail locations are approximately 150 feet apart but vary depending on the site-specific terrain and are pre-located and approved by the BLM sale administrator. Existing skid trails would be utilized to the extent practical. Any new skid trails would be pre-located and approved by the BLM.
- (3) **Helicopter Yarding:** lifts trees bunched together by a cable, moving the trees from the treatment unit to a landing area near a road. Helicopter yarding allows for full suspension of the trees from the treatment unit to the landing area and does not create skid trails or corridors. Existing helicopter landings would be used.

2. Project Design Features

Project Design Features (PDFs) are an integral part of the project design for each alternative. PDFs include seasonal restrictions on many activities in order to minimize erosion and reduce disturbance to wildlife. PDFs also outline protective buffers for sensitive species, mandate the retention of snags and down coarse woody material, and delineate many measures for protecting Riparian Reserves throughout the project. Most PDFs reflect Best Management Practices and standard operating procedures.

The PDFs with an asterisk (*) are Best Management Practices (BMPs) to reduce nonpoint source pollution to the maximum extent practical. BMPs are considered the primary mechanisms to achieve Oregon Water Quality standards. Implementation of PDFs in addition to establishment of Riparian Reserves would equal or exceed Oregon State Forest Practice Rules. A review of forest management impacts on water quality concluded that the use of BMPs in forest operations was generally effective in avoiding significant water quality problems; however, the report noted that proper implementation of BMPs was essential to minimizing non-point source pollution (Kattelman 1996). BMPs would be monitored and, where necessary, modified to ensure compliance with Oregon Water Quality Standards. The PDFs listed below apply to the Proposed Action (Alternative 2).

a. Riparian Reserves and Additional Buffers

Riparian Reserves

Northwest Forest Plan (NWFP) Riparian Reserves, as incorporated by the Medford District RMP, are located on federal lands throughout the planning area. A BLM stream survey crew conducted exhaustive surveys within the planning area in order to ensure that all areas needing Riparian Reserve protection were identified. The survey crew assessed stream condition, documented the location of wetland and unstable areas, and determined whether stream channels were perennial, intermittent, or dry draws (USDA and USDI 1994:C30-C31). Stream maps were updated with the new information. Riparian Reserves are excluded from commercial treatment units by clearly marking unit boundaries on the ground.

Riparian Reserve widths were determined site-specifically using the NWFP Standards and Guidelines (USDA and USDI 1994: C-30-31) and the *Little Butte Creek Watershed Analysis* (USDI and USDA

1997:181). See Map 2-1 for Riparian Reserve locations for the Windy Soda project area. Riparian Reserve widths in the Windy Soda project area are as follows:

- (1) Fish-bearing streams: from 320 to 400 feet slope distance on each side of the stream.
- (2) Perennial nonfish-bearing streams: from 160 to 200 feet slope distance on each side of the stream.
- (3) Intermittent nonfish-bearing streams: from 100 to 200 feet slope distance on each side of the stream. Intermittent streams have a defined channel, annual scour and deposition, and are further described as short duration or long duration:

Short Duration Intermittent: A stream that flows only during storm or heavy precipitation events. These streams can also be described as ephemeral streams.

Long-duration intermittent stream: A stream that flows seasonally, usually drying up during the summer.

- (4) Unstable and potentially unstable ground: the extent of the unstable and potentially unstable areas.
- (5) Wetlands less than one acre in size (including springs and seeps per USDA and USDI 1994: B-90), the extent of the wetland to the outer edges of the riparian vegetation. The outer edges of the riparian vegetation are approximately 100 feet from the edge of the wetland.
- (6) Constructed ponds and reservoirs, and wetlands greater than one acre: the body of water or wetland and from 150 to 200 feet slope distance from the edge of a wetland greater than one acre or the maximum pool elevation of constructed ponds and reservoirs.

Additional Buffers Adopted from Watershed Analysis

The *Little Butte Creek Watershed Analysis* (USDI and USDA 1997:181) recommended additional buffers, beyond the Riparian Reserves designated by the Medford District RMP and Northwest Forest Plan for unstable and potentially unstable areas:

- (1) Buffer the Riparian Reserves of unstable and potentially unstable areas 200 feet above, and 75 feet along each side of the Riparian Reserve. (USDI and USDA 1997:181).

b. Applicable Yarding PDFs

Objective 1: Protect Riparian Reserves

- (1) No salvage will occur in Riparian Reserves or additional buffers (see Section II, B, 2a Additional Buffers Adopted from Watershed Analysis). *
- (2) No use of skid trails in Riparian Reserves or additional buffers. *
- (3) No yarding corridors in Riparian Reserves or additional buffers. *
- (4) Safety hazard trees would be directionally felled away from Riparian Reserves or additional buffers. *
- (5) No logging slash would be piled within Riparian Reserves or additional buffers.

Objective 2: Prevent Offsite Soil Erosion and Soil Productivity Loss

- (1) Coarse woody material would be maintained at 120 linear feet per acre, at or greater than 16 inches diameter and 16 feet in length in order to protect the soil surface and maintain soil productivity. *
- (2) No green trees are targeted for removal except any trees encountered that are partially blown over (roots sprung from the ground) and identified as safety hazard trees. If safety hazard trees are encountered, directional felling away from dry draws and irrigation ditches would be practiced. Irrigation ditches in the project area would be protected from damage and kept free from slash. *
- (3) All tractor skid trail locations would be approved by the BLM Contract Administrator. Maximum area in skid trails used would be less than 12% of the harvest unit. Existing skid trails would be utilized to the extent possible. Tractors would be equipped with integral arches to obtain one end log suspension during log skidding. Skid trail locations would avoid ground with slopes over 35 percent and areas with high water tables. The intent is to minimize areas affected

by tractors and other mechanical equipment (disturbance, particle displacement, deflection, and compaction) and thus minimize soil productivity loss. *

- (4) All skid trails would be waterbarred according to BLM standards. Main tractor skid trails would be blocked with an approved barricade where they intersect haul roads. The intent is to minimize erosion and routing of overland flow to streams by decreasing disturbance (e.g. unauthorized use by OHVs). *
- (5) Tractor yarding would occur between June 15 to October 15 or on approval by the Contract Administrator. Some variations in these dates would be permitted dependent upon weather and soil moisture conditions. The intent is to minimize off-site erosion and sedimentation to local waterways.*
- (6) For all cable yarding, maximum operational suspension would be maintained on slopes greater than 50 percent. Maximum operational suspension would be practiced to alleviate gouging and other disturbance on draw side slopes and headwalls. Minimum corridor widths (generally less than 15 feet in width) would be utilized to reduce soil productivity loss. Waterbars would be constructed manually on steeper slopes with higher erosion potential to direct water off the cable yarding corridors. *
- (7) Skyline and tractor yarding would be avoided up and down dry draws. The intent is to minimize the occurrence of erosion and compaction in existing areas of concentrated surface or substrate flow. *
- (8) The BLM would immediately shut down all timber salvage yarding operations if excessive soil or off-site damage would occur due to weather or soil moisture conditions.

c. Applicable Road/Landing Maintenance PDFs

Objective 1: Prevent Offsite Soil Erosion & Soil Productivity Loss

- (1) Utilize existing roads and landings; no new roads or landings would be constructed.
- (2) Road maintenance would not occur during the wet season (October 15th to June 15th) when the potential for soil erosion and water quality degradation exists. This restriction could be waived under dry conditions and a specific erosion control plan (e.g. rocking, waterbarring, seeding, mulching, barricading). All maintenance activities would be stopped during a rain event of 0.2 inches or more within a 24-hour period or if determined by the administrative officer that resource damage would occur if construction is not halted. If on-site information is inadequate, measurements from the nearest Remote Automated Weather Station would be used. Construction activities would not occur for at least 48 hours after rainfall has stopped and on approval by the Contract Administrator. *
- (3) Landings would be treated to reduce soil erosion. Treatment of the running surface would be dependent on site conditions and would include one of the following: subsoil, till, or rip, then mulch and seed with native grasses or other approved seed; surface with durable rock material; or leave “as is” where natural rock occurs. *
- (4) All natural surface roads would be closed during the wet season. *

Objective 2: Prevent Chemical Water Pollution

- (1) The contractor would be responsible for meeting all state and federal requirements for maintaining water quality. Standard contract stipulations would include the following:
 - (a) Heavy equipment would be inspected and cleaned before moving onto the project site in order to remove oil and grease, noxious weeds and excessive soil. *
 - (b) Hydraulic fluid and fuel lines on heavy mechanized equipment must be in proper working condition in order to avoid leakage. *
 - (c) Waste diesel, oil, hydraulic fluid and other hazardous materials and contaminated soil would be removed from the site and disposed of in accordance with DEQ regulations. Areas that have been saturated with toxic materials would be excavated to a depth of 12 inches beyond the contaminated material or as required by DEQ. *
 - (d) Equipment refueling would be conducted within a confined area outside Riparian Reserves. *

- (e) Equipment containing toxic fluids would not be stored in or near (within 300') a stream channel anytime. *

d. Applicable Hauling PDFs

Objective 1: Prevent Offsite Soil Erosion

- (1) No hauling would occur on natural surfaced roads during the wet season (October 15th to June 15th). This would protect the road from damage and decrease the potential for off-site sediment movement. Some variations in these dates would be permitted dependent upon weather and soil moisture conditions of the roads.
- (2) No hauling would occur on any road during the wet season (November 15th to May 15th).
- (3) Dust abatement would include water.

e. Applicable Prescribed Fire PDFs

Objective 1: Protect Riparian Reserves

- (1) With underburns, no ignition would occur within Riparian Reserves or additional buffers. Fire lines would be minimized in Riparian Reserves or additional buffers. *
- (2) Pile burning would not occur within 50 feet of either side of the stream channel in Riparian Reserves for fish-bearing or perennial streams. Pile burning would not occur within 30 feet of either side of long-duration intermittent streams or in short-duration intermittent channels. No pile burning would occur within Riparian Reserves for wetlands or additional buffers for unstable or potentially unstable areas (Table 2-4). *

Table 2-4. Project Design Features for Prescribed Fire Treatments in Riparian Reserves.

Feature Type	Underburning	Pile Burning
Fish-bearing streams	No ignition in RR	Not allowed within 50 ft. either side of stream channel.
Perennial streams	No ignition in RR	Not allowed within 50 ft. either side of stream channel.
Long-duration intermittent streams	No ignition in RR	Not allowed within 30 ft. either side of stream channel.
Short-duration intermittent streams	No ignition in RR	Not allowed within the stream channel
Wetlands and reservoirs	No ignition in RR	Not allowed in RR
Unstable and potentially unstable areas	No ignition in RR or additional buffers	Not allowed in RR or additional buffers

Objective2: Prevent Offsite Soil Erosion and Soil Productivity Loss

- (1) Underburns would be conducted only when a light to moderate burn can be achieved (spring-like conditions when soil and duff are moist).
- (2) Firelines for underburns would be constructed manually on all slopes greater than 35 percent.
- (3) Waterbars on tractor and hand firelines would be constructed according to District guidelines (USDI 1995:167).
- (4) No pile burning would occur within the draw bottom of dry draws.
- (5) Piles would be dispersed across treatment areas. Piles would be burned when soil and duff moisture are high.
- (6) No mechanical piling allowed off of roads or landing areas.

Objective 3: Prevent Chemical Water Pollution

- (1) Foam retardant would not be used in Riparian Reserves.*

f. Applicable Oil and Hazardous Materials Emergency Response PDFs

During operations described in the proposed action, the operator would be required to have a BLM-approved spill plan or other applicable contingency plan. In the event of any release of oil or hazardous substance, as defined in Oregon Administrative Rules (OAR) 340-142-0005 (9)(d) and (15), into the soil, water, or air, the operator would immediately implement the site's plan. As part of the plan, the operator would be required to have spill containment kits present on the site during operations. The operator would be required to be in compliance with OAR 629-605-0130 of the Forest Practices Act, Compliance with the Rules and Regulations of the Department of Environmental Quality. Notification, removal, transport, and disposal of oil, hazardous substances, and hazardous wastes would be accomplished in accordance with OAR 340-142, Oil and Hazardous Materials Emergency Response Requirements, contained in Oregon Department of Environmental Quality regulations.

g. Applicable Silviculture PDFs

Objective 1: Protect Residual Leave Trees

- (1) In pine series forests where the single tree and group selection methods are used, logging slash should be handpiled outside of the driplines of individual pine trees and burned.
- (2) Prescribed burns should be performed when moisture conditions are high enough and prescription windows are at a level so that no more than 50% of the mound depth/duff layer around pine trees is consumed during burning.
- (3) No more than 25% of the pine tree live crown should be scorched for trees 8 inches DBH and larger.
- (4) Implement prescribed underburning when soil and duff moisture and weather conditions allow for low intensity burning in order to minimize tree stress and adverse effects on tree roots and foliage.

Objective 2: Regenerate Understocked Gaps by Interplanting Openings

- (1) Initial Surveys will determine planting, seedling protection, rodent control, and maintenance needs following removal of blowdown from the sites.
- (2) Planting can occur as early as Spring 2009, in Fall 2009, or split between seasons. Tree planting activities will also be based on seedling availability.

h. Applicable Terrestrial Wildlife PDFs

Objective 1: Protect Northern Spotted Owl Nest Reserves

No salvage activities would occur within designated 100-acre core areas for northern spotted owl sites designated as known sites on January 1, 1994.

Objective 2: Reduce disturbance (noise & habitat) impacts to the Northern Spotted Owl (listed as Threatened under ESA)

- (1) Work activities that produce noise above ambient levels would not occur within specified distances (see Table 2-2 below) of any spotted owl nest site or activity center, discovered pre or post January 1, 1994, between March 1 and June 30 (or until two weeks after the fledgling period) unless protocol surveys have determined the activity center to be unoccupied, non-nesting, or failed in their nesting attempt.

Table 2-2: Northern Spotted Owl Operating Restrictions

Type of Activity	Zone of Restricted Operation
Blast of more than 2 pounds of explosive	1 mile
Blast of 2 pounds or less of explosive	360 feet
Impact pile driver, jackhammer, or rock drill	180 feet
Helicopter or single-engine airplane	360 feet
Chainsaws	195 feet
Heavy Equipment	105 feet

- (2) Prescribed burning during the nesting season within 0.25 miles of occupied habitat would be dependent upon area biologist review and concurrence. The Service will be notified of all such occurrences.

Objective 3: Provide wildlife trees and habitat for cavity dependent species

- (1) No snags or green trees are targeted for removal, unless identified as a hazard tree to be removed to meet safety and OSHA regulations. Retain and protect these structures where safety is not compromised.

Objective 4: Minimize disturbance to wintering deer

- (1) Restrict activities to avoid disturbance in designated Deer Winter Range from November 15 to April 1 as required by the RMP.
- (2) All roads in designated Deer Winter Range, except major collectors and arterials, will be closed between November 15 and April 1. Restrict activities to avoid disturbance in the area during the same period.

i. Applicable Botanical Resources PDFs

Objective 1: Minimize the spread of noxious weeds

- (1) Vehicle and equipment use off existing roads in the project area would be limited to the dry season.
- (2) Mechanical equipment (e.g. skidders, yarders, etc.) would be power washed and cleaned of all soil and vegetative material before entering the project area. Equipment moving from a weed infested work site to or through a noninfested area will be field washed before moving. Field washing station would include a high pressure pump and a system to contain all plant material waste for subsequent landfill disposal.
- (3) Seeding of native grasses and/or an approved seed mix on highly disturbed soil (e.g. landings) would occur.
- (4) Roadside noxious weed populations would be treated prior to timber sale activity with subsequent treatments as necessary and as funding is available.
- (5) On roads with known weed populations, road grading and ditch pulling would not occur during periods of weed seed production and dissemination, approximately from July 15 to September 15.

j. Implementation Monitoring

Implementation monitoring is accomplished through BLMs contract administration process. Project design features included in the project description are carried forward into contracts as required contract specifications. BLM contract administrators and inspectors monitor the daily operations of contractors to ensure that contract specifications are implemented as designed. If work is not being implemented according to contract specifications, contractors are ordered to correct any deficiencies. Timber sale contract work could be shut down if infractions of the contract are severe. The contract violations would need to be corrected before the contractor would be able to continue work. If contract violations are blatant, restitution could be of a monetary value of up to triple the amount of damage.

A. INTRODUCTION

This chapter describes the present conditions of each affected resource followed by the estimated environmental effects of implementing the No-Action Alternative and the Proposed Action Alternative. The affected environment is described to the level of detail needed to determine the significance of impacts to the environment of implementing the Proposed Action or Alternative. The analysis of the direct, indirect, and cumulative effects on all identified affected resources are organized under the identified issue statements. The analysis areas for actions proposed under this EA vary by resource. For all resources it includes the project area, which encompasses the areas where actions are proposed for the Windy Soda project.

The Medford District Proposed Management Plan and Environmental Impact Statement (PRMP/EIS) describes the affected environment for the Medford District Bureau of Land Management PRMP/EIS planning area which covers approximately 858,127 acres of BLM administered lands in both the Cascade and Siskiyou mountain ranges across five counties in southwestern Oregon (PRMP/EIS p. 1-3). The Windy Soda project is located in the Cascade Mountain range in Jackson County. This EA incorporates, by reference, information included in the PRMP/EIS and will provide additional site-specific detail needed for project level planning.

1. Project and Analysis Areas

The terms **project area**, **planning area** and **analysis areas** are used throughout this chapter. The following defines each term:

The terms **project area** or treatment area are used interchangeably to describe where action is proposed, such as the actual project units where tree salvage is proposed.

Analysis areas vary by resource and include those areas that could potentially be affected by the proposed action. In some cases the analysis area is confined to the project area and in others the analysis area extends beyond the project and planning area boundaries.

2. Consideration of Past Actions in the Analysis of Effects

The current condition of the lands affected by the proposed action is the result from a multitude of natural processes and human actions that have taken place over many decades. A catalogue and analysis, comparison, or description of all individual past actions and their effects which have contributed to the current environmental conditions would be practically impossible to compile and unduly costly to obtain. Ferreting out and cataloguing the effects of each of these individual past actions would be a time consuming and expensive task which will not add any clearer picture of the existing environmental conditions. Instead of incurring these exorbitant costs in terms of time and money it is possible to implement easier, more accurate, and less costly ways to obtain the information concerning past actions which is necessary for an analysis of the “impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.” (See definition of “cumulative impact” in 40 CFR § 1508.7.)

As the Council on Environmental Quality (CEQ), in guidance issued on June 24, 2005, points out, the “environmental analysis required under NEPA is forward-looking,” and review of past actions is required only “to the extent that this review informs agency decision-making regarding the proposed action.” Use of information on the effects on past action may be useful in two ways according to the CEQ guidance. One is for consideration of the proposed action’s cumulative effects, and secondly as a basis for identifying the proposed action’s direct and indirect effects.

The CEQ stated in this guidance that “[g]enerally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions.” This is because a description of the current state of the environment inherently includes the effects of past actions. The CEQ guidance specifies that the “CEQ regulations do not require the consideration of the individual effects of all past actions to determine the present effects of past actions.” The importance of “past actions” is to set the context for understanding the incremental effects of the proposed action. This context is determined by combining the current conditions with available information on the expected effects of other present and reasonably foreseeable future actions.

Watershed analysis, a component of the Aquatic Conservation Strategy developed under the Northwest Forest Plan and incorporated into the Medford District RMP, is a useful analysis for gaining an understanding of ecological processes and how those processes are functioning within a given watershed. A watershed analysis characterizes the human, aquatic, riparian and terrestrial features, conditions, processes, and interactions within a watershed including the effects of past and ongoing actions. Knowledge gained through watershed analysis enhances the agency’s ability to estimate direct, indirect, and cumulative effects of management activities (Federal Agency Guide to Watershed Analysis p. 1). The 1997 Little Butte Creek Watershed Analysis is the result of a coarse filter analysis generally using existing data and information; however, it is useful in identifying issues of importance to analyze in greater detail during project specific analysis. Some issues identified during watershed analysis have been analyzed and addressed at broader scales in association with regional and local land use plans, the link from this site specific project to these broader analyses has been noted where applicable in this Environmental Assessment.

Effects analyses completed for resources affected by the Windy Soda project, describe indicators of importance along with the spatial and temporal scale of importance (analysis area) for determining the effects of multiple actions (past, current, and reasonably foreseeable) on affected resources¹. As discussed above, the current condition assessed for each affected resource inherently includes the effects of past actions.

3. Consideration of Ongoing and Reasonably Foreseeable Actions in the Analysis of Effects²

The analysis of the effects of other present and reasonably foreseeable actions relevant to the effects of the proposed action is necessary. How each resource analysis uses the following information is, however, dependent on the geographic scale of concern and attributes considered during each resource analysis. Reasonably foreseeable actions are considered and analyzed as appropriate specific to each affected resource.

¹ The analyses look at all effects of the proposed action and alternative regardless of whether they are direct or indirect. Direct effects are the impacts caused by the action (activities) that occur at the same time and place; indirect impacts are those impacts caused by the action (activities) but occur later in time or farther removed in distance, but are still reasonably foreseeable. The term cumulative effects denotes the fact that the analyses of direct and indirect effects must not be done in isolation, but in the context of other actions whether from the past, present, or reasonably foreseeable future, and whether human-caused or natural.

B. Effects of Implementation

1. What is the potential for impacts to soils and site productivity?

The soils in the project area formed from material weathered from igneous rock on plateaus and hillslopes. The topography ranges from 5 percent to near 60 percent. The soils series identified in the project area are Bybee, Farva, McMullin, McNull, Medco, Tatouche and Woodseye. The Bybee, McNull, Medco, and Tatouche soils have montmorillonitic mineralogy, which causes these soils to have high shrink-swell potential and are subject to severe compaction. The Farva, McMullin and Woodseye soils have high rock content and/or are shallow in depth which limits moisture holding capacity. The Bybee and Medco soils have perched water tables December through May. The following table lists the soil characteristics of respective soil series. A map showing the location of these soils on the landscape is on file.

Table 3-1. Project Area Soils

Soil #	Soil Series Name	Soil Depth	Surface Texture	Subsoil Texture(s)
18	Bybee	60"+	loam	clay
56/58	Farva	20-40"	very cobbly loam	cobbly loam
110/113/117	McMullin	<20"	gravelly loam	gravelly clay loam
114/115/117/119	McNull	40-60"	clay loam	cobbly clay
119/123/124	Medco	20-40"	cobbly clay loam	clay
19/20/190/191	Tatouche	60"+	gravelly loam	clay
207	Woodseye	<20"	very stoney loam	very cobbly loam

Site Productivity

Soil is a fundamental resource that controls the quantity and quality of such renewable forest resources as timber, wildlife habitat, forage, and water yield. Soil productivity is the inherent capacity or potential of a soil to produce vegetation and the fundamental measure of soil productivity is the site's carrying capacity for plant growth. The key properties directly affected by management are soil porosity and site organic matter (OM). These two properties regulate critical site processes through their roles in microbial activity, soil aggregate stability, water and gas exchange, physical restrictions on rooting, and resource availability (Powers, 2004 p.194). Although other factors such as water regimes, soil biological types and populations, and erosion can also affect long-term soil productivity, site organic matter and soil porosity are most important when measuring the effects of management.

A sustained flow of organic matter from primary producers to the forest floor and into the soil is vital to sustained site productivity through its influence on soil protection, the activity of beneficial soil organisms, soil water holding capacity, soil structure and aggregate stability, and nutrient supply. Organic matter influences the interception and retention of solar heat by the soil. It dissipates the energy of falling water. Organic matter is the ultimate source of substances that bind soil particles together into stable aggregates that resist erosion. Through its carbon compounds, organic matter constitutes the energy source for soil fauna and microbes and is a concentrated reservoir of plant nutrients supplied to the soil.

In the project area, organic matter is abundant on all sites that are planned for treatment. Most of the organic matter is in the form of trees, shrubs, grasses, and moss. Soil organic matter appears typical for the region with most of the sites having less than ½ inch of litter (leaf and needles). Some sites with a mature forest canopy have a litter layer about 1 inch thick. Except for areas disturbed by roads and trails

and sites with gravel and cobble surfaces, the soil had at least a thin ground cover of organic material. On most sites, soil organic matter consumption appears normal with a very thin layer of decomposing matter at the soil and litter layer interface.

The reduction in soil porosity results in the loss of soil aeration, moisture availability and increases the resistance of soil particles to root growth. Reduced soil porosity also can reduce water infiltration rates, thereby accelerating surface runoff and soil erosion. The size distribution of soil pores is also important for maintaining a productive site. Large pores and cracks are important for soil drainage, aeration, and root access; smaller pores store soil water and are the sites of nutrient retention and microbial activity. Both kinds of pores are required for productive soils.

Rapid gas exchange in soils is required for optimum microbial activity and growth of plant roots. Adequate supply of oxygen for root growth can be assured if there is a network of continuous, air-filled pores present in a soil. Soil water storage is very important because total site water use is generally positively correlated with growth, factors that decrease soil water storage are detrimental to productivity and those that increase it are beneficial (Childs et al. 1989).

The appropriate scale for measuring soil productivity criteria (compaction, erosion, etc.) is site specific or on a unit by unit basis. The appropriate scale for measuring erosion or compaction that may affect water resources would be the designated analysis area (see Water Resource section for analysis areas). Short-term impacts (or effects) to soils are those being 5 years or less and long-term more than 5 years. Studies (Rice et al., 1972) and local observations by BLM soil scientist reveal that vegetation recovery and erosion rates return to near normal levels within approximately 5 years.

As a result of implementing designated skid trails, the units tractor logged would result in approximately twelve percent or less of the area compacted (USDI, 1995, p.156). Designating skid trails would reduce the area that would be deeply disturbed during tractor logging operations. In a study of thinnings and partial cutting by yarding systems, tractor logging caused soil disturbance on about 21 percent of the site resulting in 13 percent displacement and 8 percent compaction. Skyline cable yarding disturbed about 7 percent of the site, with 7 percent displacement and <1 percent compaction (Landsberg, 2003, p.29). Helicopter yarding in a clearcut showed 2 percent deep disturbance and no measurement for compaction (Clayton, 1981, p.6). Because the Windy Soda Salvage project will be primarily utilizing existing skid trails the amount of newly disturbed or compacted area will be less than estimates for logging in previously undisturbed areas.

Short-term erosion rate potential would increase moderately (15-50% over undisturbed rates) in the tractor units where slopes exceed 20 percent and where the skid trails are not on the contour. Most of the eroded particles would not reach waterways as a result of riparian reserves buffers, waterbars and the dispersal of yarding skid trails. The decrease in soil pore space, as a result of the compacted skid roads, causes a slower infiltration rate and larger amounts of sediment laden surface runoff. On slopes less than 20 percent and skid roads that follow the contour, runoff velocity tends to be reduced and soil particles transported only a short distance.

Erosion rates in the cable or helicopter units would exhibit only a slight (<15%) increase over natural levels. In the cable units, disturbance would be similar to those reported by Landsberg (7 percent of the cutting unit area). The yarding trails are usually narrow (2-4 feet), with shallow compacted troughs of surface soil partially covered by scattered litter and slash, which helps to slow and disperse water runoff and hold soil particles on site. On steeper slopes (+60%) with higher erosion potential, waterbars would be constructed manually to direct water off the yarding trails. Although erosion rates would increase in the harvested units, most soil particles would not reach local waterways under normal rainfall conditions and return to near normal rates usually within 5 years as vegetative cover is re-established. In most operations, a major portion of the harvest area would remain essentially undisturbed. Even logging systems that cause the most disturbances seldom bare more than 30 percent of the soil surface. Since

surface erosion depends primarily on extent and continuity of bare areas, soil loss is usually slight (Rice, 1972).

Geppert (1984) concluded that cumulative surface erosion should result from the construction and existence of road networks, but that forest harvest and site preparation should not result in cumulative erosion, except when poorly applied on poor or harsh sites (Beschta, n.d.). There are no harsh or poor sites being treated in this proposed alternative as such sites were screened through the Timber Productivity Capability Classification process (USDI, 1994, page 3-85) and taken out of the timber harvest base.

Prescribed burning planned under this alternative would be in the form of handpile burning or underburning. The intensity of the underburn would be light to moderate and have slight direct short-term effect on soil properties. A light surface fire will generally only char the litter, leaving most of the mineral soil at least partially covered. A moderate burn would result in the duff, rotten wood, or other woody debris partially consumed; mineral soil under the ash not appreciably changed in color. Most soil and ash movement occurs during the first rainy season after the slash is burned and quickly diminishes as vegetation cover re-establishes. A recent study concluded that prescribed restoration fires did not have a significant effect on soil solution and stream chemistry or stream sediment concentrations and that low-intensity, low-severity fires could be used effectively as a tool to restore vegetation structure and composition (Elliot, 2005. p.5).

The increase in erosion rates over present levels would be less than 15 percent as a result of burning handpiles because the piles would be spaced throughout and occupy approximately 3 to 5 percent of the total area. The increased potential of soil particles reaching the local waterways as a result of the prescribed burning would be low because of prescribed riparian buffers and handpiling of slash would not occur near waterways. High soil temperatures generated by burning piles would severely and negatively affect soil properties in the 3 to 5 percent of the unit by physically changing soil structure and reducing nutrient content. In most pile burning operations, the duff and woody debris is completely consumed. Duff and woody debris represent a storehouse of minerals and protection for the soil surface. Since Nitrogen losses are roughly proportional to the amount of duff consumed, burn prescriptions that allow greater retention of woody debris benefit long-term site productivity. Burning volatilizes organic Nitrogen or changes it into a readily available form (for plant use). Large proportions of the total Nitrogen budget can be lost through volatilization in the sites where pile burning occurs. Total foliar Nitrogen content also is reduced (14% in moderate burns, 33% in intense burns), and the effects last at least 4 years (Atzet, 1987 p.193). Overall, soil productivity would experience a slight (<15%), negative decrease short-term effects but potential long-term positive effects would be realized from the proposed action as the risk of severity fire would be reduced for the acres treated.

Past Actions

An inventory of past actions with harvest dates and units of treatments was made for the analysis area using past harvest records and photo interpretation. Timber harvest records in combination with the operations inventory data were used on land managed by the BLM. A nearly complete harvest data record was available from about 1975 to present. An inventory of harvest activities prior to 1975 on BLM-administered land was estimated using operation inventory records and aerial photo interpretation. The inventory of past harvest activities on private land was estimated using aerial photo interpretation. The aerial photos used were from 1966, 1975, 1980, 1985, 1991, 1996, 2001, and 2005. The past actions were digitized in Geographic Information Systems (GIS) layer and a corresponding database established.

The relevant part of analyzing past actions is determining what events or actions previously occurred, whether current proposals repeat those actions or events, and whether current proposals have similar or different anticipated effects. In addition, past events are manifested in current conditions, the starting point for the addition of cumulative effects. The lessons learned from past actions are that roads were historically poorly designed and located without regard to erosion and sedimentation impacts. Clearcutting and broadcast burning in the 1980's created highly erosive conditions especially when

ground-based yarding systems were used without much regard for the location and number of skid trails, and/or tractor-piling of slash was incorporated. These sites have been re-established with vegetation and, save for roads, erosion rates are near natural levels.

All of the proposed Windy Soda Salvage units were previously harvested approximately 4 years ago under the Indian Soda timber sale. Site visits to some of the recently harvested units on BLM during 2006 field season and again during the spring/summer of 2008, revealed that soils in these units have stabilized since the last entry and units are recovering adequately from previous management activities with erosion rates being near natural levels. The designated skid roads and yarding corridors have re-vegetated and show no signs of excessive erosion. Project design features require the use of pre-designated skid trails and yarding corridors; existing skid trails would be utilized to the extent possible. It is anticipated that the majority of harvesting of the downed timber would be accomplished using the existing skid roads and trails. Project design features also require that log hauling is completed during the dry season (June 15 through October 15). Based on implementation of required project design features it is anticipated that minimal negative effects would occur to the soil resource as a result of the proposed project. These minimal effects are within the impacts disclosed in the Medford RMP EIS for timber harvest related activities.

2. What is the potential for impacts to water resources?

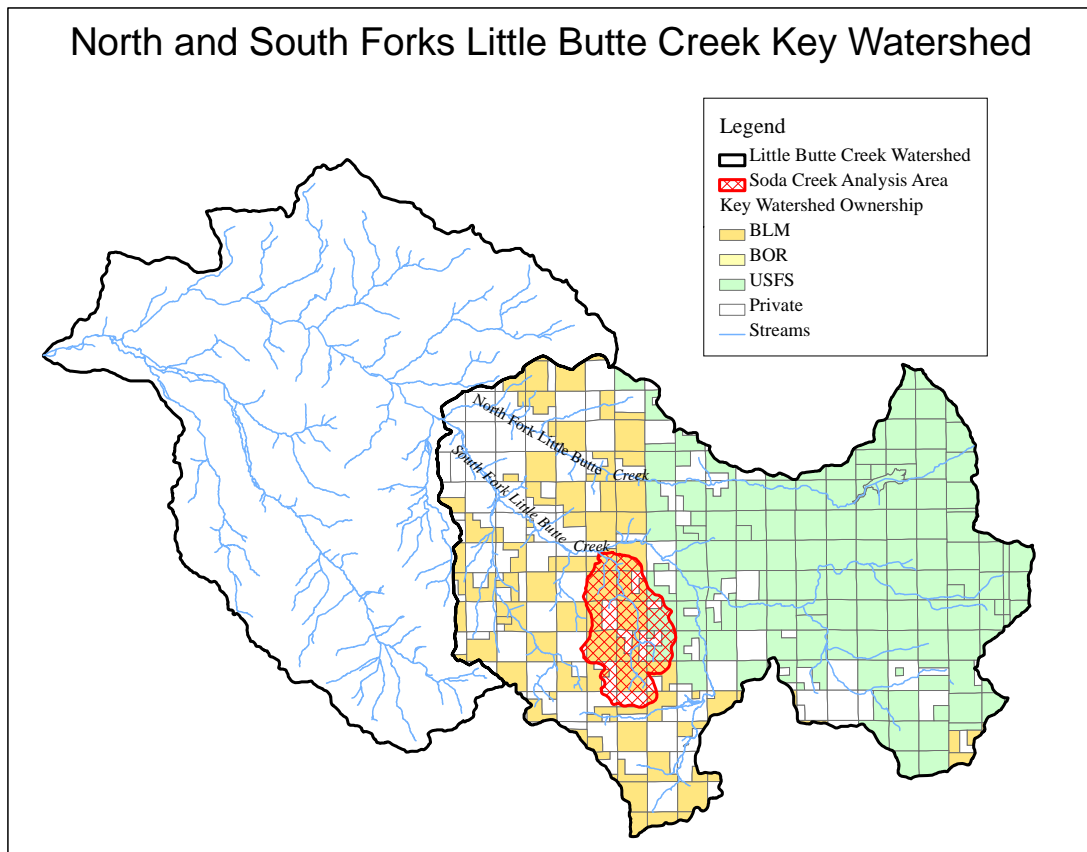
The *Little Butte Creek Watershed Analysis* (USDI and USDA 1997) provides general water resources background information for the project area.

Analysis Area Description

The proposed 413 acre Windy Soda project is within the Little Butte Creek Watershed. The Little Butte Creek Watershed is one of seven fifth-field watersheds within the Upper Rogue Subbasin. The project area is predominantly within the Soda Creek analysis area with only four acres that encroach slightly over the ridgeline into the adjoining Deer Creek drainage area. The Soda Creek analysis area is composed of three small drainage areas that all drain into Soda Creek. Soda Creek drains into a single outlet point at the confluence with South Fork Little Butte Creek. Portions of the Soda Creek analysis area are outside the project area and would not be directly affected by the proposed project activities but are considered for cumulative effects analysis. The Deer Creek drainage area will not be analyzed in depth; however, the effects of the proposed project activities in this area will be addressed.

The analysis area is entirely within the North and South Forks Little Butte Creek Key Watershed (Map 3-1) as designated in the *Northwest Forest Plan* (USDA and USDI 1994).

Map 3-1. Location of Analysis Area within Little Butte Creek Watershed and the North and South Forks Little Butte Creek Key Watershed



The Soda Creek analysis area is 7,079 acres, with 62 percent managed by the BLM. This size of analysis watershed is large enough to assess the cumulative effect of actions that, taken individually (site scale) may not be significant, but when combined with effects from everything else going on in the drainage, may have a potential significant impact (“cumulative effect”). The analysis areas are small enough to avoid “drowning out” evidence of adverse effects. As the size of the analysis area increases, there is an increasing possibility of the analysis indicating that there is “no problem” when in fact individual drainages may have issues of concern.

The Deer Creek drainage area to the west of Soda Creek is 3,060 acres, with 53 percent managed by the BLM and the rest privately owned. The proposed project area covers 0.1 percent of the Deer Creek drainage area.

Some of the large blocks of private lands in the upland areas are owned by industrial forest companies. Ownership of the remaining privately-held land in the area being analyzed is typically held in relatively small parcel holdings.

Surface Water

Surface water in the Soda Creek analysis area includes streams, springs, and wetlands. Streams are classified as perennial, intermittent with seasonal flow (long duration intermittent), intermittent with ephemeral flow (short duration intermittent), and dry draws with ephemeral flow. Stream types on BLM-managed lands were identified through site visits; U.S. Forest Service and non-federal land stream types were estimated using aerial photo interpretation and extrapolation from information on adjacent BLM-

managed lands (Table 3-2). Streams categorized as perennial or intermittent on federal lands are required to have Riparian Reserves (see Chapter 2) as defined in the *Northwest Forest Plan* (USDA and USDI 1994). Dry draws do not meet requirements for streams needing Riparian Reserves because they lack the combination of a defined channel and annual scour and deposition (USDI 1995:27). Streams on private forest lands are managed according to the Oregon Forest Practices Act, which classifies and protects streams based on three beneficial use categories (fish use, domestic water use without fish use, and all other streams).

Table 3-2. Stream Miles by Stream Type and Ownership

Analysis Area	Miles of Stream by Type and Ownership												Total Stream Miles				Stream Drainage Density (Mi./Mi. ²)
	Perennial			Long Duration Intermittent			Short Duration Intermittent			Dry Draw							
	BLM	FS ¹	PV ¹	BLM	FS	PV	BLM	FS	PV	BLM	FS	PV	BLM	FS	PV	All Lands	
Soda Creek	13.0	0.2	2.5	9.0	1.4	4.7	1.8	0.3	0.3	11.0	2.3	6.7	34.8	4.1	14.2	53.1	4.8

1 FS = Forest Service, PV = private.

There are approximately 53.1 stream miles within the Soda Creek analysis area, with 66 percent on BLM-administered lands. There are 15.7 miles (30 percent) of perennial streams, 15.1 miles (28 percent) of long duration intermittent streams, 2.4 miles (4 percent) of short duration intermittent streams, and 20 miles (38 percent) of dry draws within the analysis area. Stream drainage density is 4.8 miles per square mile.

There is no surface water in or adjacent to the proposed units in the Deer Creek drainage area.

No private water developments on BLM-administered lands within the analysis area were found on the Oregon Water Resources Department website³. BLM records were also checked to determine any right-of-ways or other authorizations for diversion structures, water storage, or water transport facilities in the analysis areas.

Groundwater

Groundwater supplies in the project area are limited due to the low permeability of the volcanic rocks found in the majority of the area (USDI and USDA 1997:36). The proposed Windy Soda project area has not been identified as a critical groundwater area by the Oregon Water Resources Department (OWRD 1989).

a. Water Quantity

This section discloses the impacts from proposed removal of windthrown trees and fuels treatments on water quantity. Impacts to water quality are discussed in the subsequent Water Resources-Water Quality section. Aquatic habitat and riparian areas discussed in the Fisheries section.

Issues/Concerns

Scoping (external and internal) generated the following issue/concern related to implementing the proposed action. These effects may or may not occur as a result of the proposed action but were of concern to members of the public and/or BLM ID team specialists.

- Increases in soil compaction from proposed logging activities and fuels treatments may affect streamflows.

Soil compaction (due to ground-based logging and the presence of forest roads and trails) may increase the frequency and magnitude of peak streamflows (Harr 1976a). In undisturbed forest soils in western

³ <http://egov.oregon.gov/OWRD/>

Oregon, infiltration capacities far exceed the maximum rates of rainfall so that all water enters the soil (Harr 1976b), thus minimizing overland flow. Compaction reduces the infiltration properties of the soil, resulting in increased runoff. Soil compaction can also impede the subsurface movement of water as it moves downslope in shallow aquifers. Peak flows for small, headwater streams appear to be increased where at least 12 percent of a watershed was severely compacted by road building, tractor skidding, or tractor windrowing of slash (Harr 1976a). Factors that influence the contribution of a compacted area to increased runoff include: proximity of compacted area to streams, connectivity of compacted areas to streams, and watershed characteristics (Harr et al. 1979). Severe fire that exposes bare soil can also reduce the infiltration properties of the soil, resulting in increased runoff (Neary et al. 2005).

Roads also have the potential to affect hydrologic processes by intercepting subsurface water moving down slope, concentrating flow, and diverting or rerouting water from paths it otherwise would take were the roads not present (Gucinski, et al. 2001). No changes to the existing road system are proposed, therefore roads will only be addressed as part of the soil compaction discussion.

Reducing crown closure has the potential to affect streamflows (Moore and Wondzell 2005), however, the proposed action does not include any reduction of crown closure and it will not be addressed in this analysis.

Affected Environment

Average annual precipitation in the Soda Creek analysis area ranges from about 38 inches at the mouth of Soda Creek (elevation 2,140 feet) to 49 inches at the headwaters (elevation 5,120 feet) (USDI and USDA 1997:222). Precipitation falls predominately from November through March and summer months are typically very dry (USDI and USDA 1997:19-20). The rain patterns in the winter months are wide based with relatively low intensity and long duration in contrast to localized, short duration, and high intensity summer storms that occasionally occur.

Within the analysis area, rain predominates in the lower elevations (generally below 3,500 feet). Winter precipitation in the higher elevations (generally above 5,000 feet) usually occurs as snow, which ordinarily melts during the spring runoff season from April through June. A mixture of snow and rain occurs between approximately 3,500 and 5,000 feet elevation (USDI and USDA 1997:9) and this area is referred to as either the rain-on-snow zone or transient snow zone. The snow level in this zone fluctuates throughout the winter in response to alternating warm and cold fronts. Shallow snow packs often build up in this elevation range, and then are quickly melted by rain and warm winds (rain-on-snow event). There are 5,001 acres (71%) of transient snow zone in the Soda Creek analysis area.

A U.S. Geological Survey (USGS) gaging station located on the South Fork Little Butte Creek near Lake Creek (above the Medford Irrigation District Canal diversion) collected streamflow data from 1922 to 1957 and 1961 to 1982 (USDI and USDA 1997:38). Mean monthly streamflows ranged from a low of 18.2 cubic feet per second (cfs) in August and September to a maximum of 236 cfs in April. Low flows normally coincide with the period of low precipitation from July through October. The highest streamflows usually occur from December through May (USDI and USDA 1997:39). Streamflows during the months of April and May and part of June are augmented by melting snowpack in the high elevations. Significant flows can also be produced by local, high intensity summer storms, although these events are relatively rare and their effect is limited to the local area.

Past Actions

Water quantity in the Soda Creek analysis area is a function of natural and human-caused factors. Natural site factors include climate, geology, and geographic location. Natural processes that have influenced water quantity include floods, wildfires, and drought. Past human activities that have altered water quantity in the analysis area include timber harvest, road operations, and fire suppression. There are no major water withdrawals in the Soda Creek analysis area.

Streamflows are naturally low during the summer due to low precipitation, reduced soil drainage, and sustained high evapotranspiration (MacDonald et al. 1991:95). Fire suppression has resulted in overly dense forest stands with high evapotranspiration rates that likely contribute to decreasing the amount of water available for summer streamflows. Past harvests in the analysis area often included riparian vegetation. Vigorous regrowth of phreatophytic (i.e. deeply rooted trees that obtain their water from the water table) hardwoods following harvest of riparian areas significantly increased evapotranspiration rates during the growing season, causing a reduction in summer flows (Hicks et al. 1991:224).

Areas of compacted soil, such as occur from roads, tractor yarding, or ground-based fuel treatments, can be a concern from a hydrologic perspective because such areas can decrease the infiltration properties of the soil, resulting in increased surface runoff. This can also contribute to decreased soil moisture within and downslope of the compacted area. To determine past soil-compacting treatments, we used timber sale and fuel treatment records for BLM-administered lands and aerial photo analysis for non-BLM lands (see Soils section). The following assumptions were used to calculate the compacted area resulting from roads and past treatments (Table 3-3): 1) roads are assumed to be permanently compacted at the rate of 7 feet width for jeep roads, 12 feet width for natural or unknown surfaced roads, 15 feet width for rocked roads, and 16 feet width for paved roads (Samuelson 2006); 2) 25 percent of the harvest acreage is compacted for all units tractor logged on private lands and those on BLM-managed lands tractor logged prior to 1983 (Swanston and Dyrness 1973:266; Adams and Froehlich 1981:10); 3) 12 percent of the BLM tractor units harvested in 1983 or later are considered compacted (USDI 1979); 4) 4 percent of the harvest acreage are compacted for cable units (Dyrness 1967:266); 5) 1 percent of helicopter units is compacted (Clayton 1981:6); and 6) 20 percent of ground-based fuel treatment units are estimated to be compacted based on Medford District data (Hass 2006).

We obtained road miles from the BLM GIS data base, from an aerial photo (2005 photos) survey, and field visits. This is the best information available, although we acknowledge that there may be roads not included such as non-GIS roads that are hidden by tree canopy, OHV trails, and private roads built after the 2005 photos. These additional roads would not change the outcome of the analysis.

Table 3-3. Estimated Existing Soil Compaction for All Lands

Analysis Area	Compacted Area From Past Treatments				Compacted Area From Roads (Acres)	Total Compacted Area (Acres)	Total Compacted Area (%)
	Tractor (Acres)	Cable (Acres)	Helicopter (Acres)	Ground-based Fuel (Acres)			
Soda Creek	330	17	2	0	102	451	6.4%

The 6.4 percent compacted area in the Soda Creek analysis area (Table 3-3) is below the 12 percent level of concern identified for potential increases in peak flows (Harr 1976a).

Environmental Consequences

Because no new management is proposed under Alternative 1, the effects described reflect current conditions and trends that are shaped by ongoing management, reasonably foreseeable future actions, and events unrelated to the Windy Soda project. Discussion for Alternative 2 reflects the direct and indirect impacts of the proposed action. Effects discussion also includes cumulative impacts of those direct/indirect actions when added incrementally to actions past, present, and reasonably foreseeable. Short-term effects are defined as those lasting ten years or less and long-term effects last more than ten years (USDI 1994:4-4).

Alternative 1

No actions are proposed under Alternative 1 (the No Action Alternative); therefore direct and indirect effects are the current conditions in the project area which are the result of past actions not related to the

Windy Soda project. Alternative 1 describes anticipated effects of not implementing an action at this time.

Under Alternative 1, there would be no changes in areas of compacted soil. There would therefore be no change to the potential risk of increasing the magnitude and frequency of peak flows.

In the event that a severe, stand-replacement fire occurs in the future (see Fire section) it could drastically alter the surface water and groundwater regime. A wildfire in the areas with windthrown trees would likely be more severe if the down trees on BLM-administered lands are not removed. Immediately after a severe fire, the loss of vegetation would make more groundwater available for streamflow and low summer flows would likely increase. However, the absence of vegetation would also result in an increased risk of higher peak flows. In a relatively short time vegetation would reestablish and less water would be available for summer flow. It would take a longer period of time for vegetation to recover sufficiently for peak flows to return to their normal range.

Past events in the analysis area that currently have the potential to influence peak streamflows include past timber harvesting, wildfire, and road construction. These activities potentially influence peak streamflows through canopy removal, soil compaction, or drainage networks alteration. The risk assessment for potential increased peak flows due to existing soil compaction considers the effects of these past actions. For example, areas previously harvested (including units harvested or partially harvested under the Indian Soda, Lost Cow, Fire Pit, Carbonated Soda, Deer Conde, Rock Top, Flat Top, Far Piece, Poole Hill, and Conde Blowdown timber sales) are included in the existing soil compaction analysis. There has not been a major wildfire in the Soda Creek analysis area within the past 30 years.

A private timber company is currently harvesting timber on approximately 20 acres in the Soda Creek analysis area. This area was harvested previously and is included in the analysis of existing soil compaction (Table 3-3).

In summary, there is virtually no risk to increased peak flows as a result of past or present soil compacting activities for the Soda Creek analysis area.

Reasonably foreseeable future actions planned for BLM-administered lands in the analysis area include the South Fork Little Butte Creek timber sale, routine road maintenance activities, and continued livestock grazing. There are no reasonably foreseeable future actions proposed for Forest Service-managed lands within the analysis area.

Soil compaction resulting from the reasonably foreseeable South Fork Little Butte Creek timber sale (Table 3-4) is computed using the following assumptions. Tractor yarding would be limited to designated skid trails, minimizing the compacted area to 12 percent. Compaction is assumed to be 4 percent from cable yarding and 1 percent from helicopter yarding (Dyrness 1967; Clayton 1981). Compaction from proposed yarding is calculated for areas that were not included for existing condition or areas previously harvested, but that used a yarding method that resulted in less compaction than proposed. Compacted area from the proposed helicopter landing is assumed to be one acre. No new roads or ground-based mechanized fuel treatments are proposed. Existing roads proposed for mechanical decommissioning would result in a reduction of compacted area.

Table 3-4. Estimated Compacted Area¹ Resulting from South Fork Little Butte Timber Sale

Analysis Area	Estimated Compacted Area From Proposed Yarding, Landings, Roads					Reduction in Compacted Area from Proposed Mech. Decom. ³ (Acres)	Total Compacted Area From Proposed Action (Acres)	Total Compacted Area From Proposed Action (%)
	Tractor Yarding (Acres)	Cable Yarding (Acres)	Heli-copter (Acres)	Heli-copter Landings (Acres)	Roads ² (Acres)			
Soda Creek	26	5	2	1	0	-3	31	0.4%

1/ Compacted area rounded to nearest acre.

2/ Based on 15 ft. road width for compacted surface and includes both proposed permanent and temporary roads.

3/ Based on 12 ft. road width being decommissioned (except 15 ft. road width for new temporary roads).

Under reasonably foreseeable future actions for private lands, it is assumed that private forest lands would continue to be intensively managed for timber production on approximately a 60-year rotation (USDI 1994:4-5). The actual timing of any private lands timber harvest is dependent on many factors, including valuations based on supply/demand, ownership, etc. We developed a reasonably foreseeable future scenario for private lands by using 2005 aerial photos and assuming a 60-year rotation for private timber lands within the analysis area. We determined that 508 acres within the Soda Creek analysis area could be harvested under this scenario. Most areas that could be harvested on private lands are accessible by existing roads, so no new road construction is included in the reasonably foreseeable future scenario.

Private timber lands identified for future harvest were included in the reasonably foreseeable future compacted area calculations if they were not previously harvested or if they were harvested prior to 1975. For this analysis, we assumed that tractors would be used for future harvest on private timber lands if the slopes are 60 percent or less. Using this assumption, all reasonably foreseeable future harvest on private lands would be tractor logged and we assumed that 25 percent of the harvest acreage would be compacted for tractor logging on private lands. The estimated compacted area for reasonably foreseeable future harvest on private lands would be 193 acres in the Soda Creek analysis area.

Compacted area would increase by 3.1 percent in the Soda Creek analysis area as a result of the reasonably foreseeable future harvest activities on private and BLM-administered lands (Table 3-5). The total percent compacted area would remain below the 12 percent level of concern in the Soda Creek analysis area.

Table 3-5. Estimated Soil Compaction for All Lands after Reasonably Foreseeable Future Soil Compacting Actions¹

Analysis Area	Estimated Compacted Area From Foreseeable Future Treatments (Acres)	Existing Compacted Area (Acres)	Existing and Future Compacted Area (Acres)	Total Compacted Area (%)	Increase in Percent Compacted Area (%)
Soda Creek	224	451	675	9.5%	3.1%

1/ Reasonably foreseeable future soil compacting actions anticipated on private timber lands and BLM-administered lands.

In conclusion, past, present, and reasonably foreseeable future actions resulting in soil compaction within the Soda Creek analysis area would not have a high risk of increasing the magnitude and frequency of peak streamflows because levels of soil compaction would be below the level of concern.

Alternative 2

Alternative 2 would not affect streamflows in the Soda Creek analysis area or the Deer Creek drainage area. Under Alternative 2 there would be no new roads or landings, and where feasible, existing yarding corridors and skid trails would be used. For the Soda Creek analysis area, where current soil compaction

levels are at 6.4 percent (Table 3-3), yarding activities would occur on approximately 409 acres (110 acres of cable, 263 acres of tractor, and 36 acres of helicopter). We used the same compaction assumptions as for the South Fork Little Butte project under Alternative 1 to determine the maximum area that could be compacted under Alternative 2. Soil compaction that would result if all new yarding corridors and skid trails were built would be 0.5 percent and bring the current compaction level to 6.9 percent. The actual new compaction that would occur as a result of the proposed action would be much less than 0.5 percent of the analysis area because the units have been previously harvested and existing yarding corridors and skid trails would be used. For the Deer Creek drainage area, only four acres (approximately 1 acre of cable yarding, 2 acres of tractor yarding, and 1 acre of helicopter yarding) of windthrow removal are proposed. Even if all new yarding corridors and skid trails were used, the total compacted area in the Deer Creek analysis area would be 0.3 acre (less than 0.01 percent of the drainage area) and there would be no change in the existing compaction levels and no affect on peak flows.

Under Alternative 2 there would not be any connectivity from the yarding activities to stream channels. Project design features such as no yarding in Riparian Reserves, waterbarring tractor skid trails, and avoiding tractor skid trails on slopes over 35 percent, would prevent surface flow from traveling very far down skid trails or reaching stream channels.

The average post-treatment crown closure would be the same as the current condition, and would differ between individual units due to the variability of the blowdown severity. There is likely to be a few standing, root-sprung, or hazard trees that would need to be felled for safety of yarding operations. However, the few trees of this type are widely scattered throughout all units, and felling them would not result in a measurable change in crown closure.

Fuels treatments (including handpiling and burning or lopping and scattering) within the harvest units would only affect the understory vegetation and not change the crown closure. The proposed treatments would reduce the risk of severe fire.

The proposed action would include cleaning debris from roads, drainage ditches, and culverts allowing the drainage system to function efficiently, disperse road runoff, and decrease the rapid, concentrated routing of water to streams during storm events.

In conclusion, Alternative 2 is not expected to increase peak flows in the Soda Creek analysis area affected by the proposed project because:

- 1) the proposed action would not affect crown closure;
- 2) there would be no new roads or landings;
- 3) soil compaction levels would remain below the 12 percent level of concern; and
- 4) proposed road maintenance would improve and reestablish drainage patterns thus allowing road runoff to disperse.

The analysis of the direct and indirect effects of Alternative 2 on water quantity incorporates past and present actions that may affect watershed conditions. For the cumulative effects analysis, the direct and indirect effects of Alternative 2 need to be added to the reasonably foreseeable future actions. Reasonably foreseeable future actions in the analysis area are assumed to be the same as under Alternative 1.

The Windy Soda project would only result in a very small amount (much less than 35 acres) of soil compaction to the Soda Creek analysis area. For analysis purposes, the maximum soil compaction of 35 acres (0.5 percent) in the Soda Creek analysis area is used. Increases in compacted area as a result of reasonably foreseeable future harvest activities on all lands are identified under Alternative 1 (Table 3-5). The cumulative effect of adding the incremental soil compaction from Alternative 2 to the past, present, and reasonably foreseeable future soil compaction would result in 10 percent of the area being compacted (Table 3-6). The total compacted area would remain under the 12 percent level of concern.

Table 3-6. Percent Compacted Area with Implementation of Alternative 2 on BLM-Administered Lands and Reasonably Foreseeable Future Soil Compacting Actions on All Lands

Analysis Area	Estimated Existing Compacted Area (%)	Estimated Compacted Area From Future Treatments on All Lands (%)	Estimated Maximum Compacted Area From Alternative 2 (%)	Total Compacted Area (%)
Soda Creek	6.4%	3.1%	0.5%	10.0%

The cumulative effect of adding the incremental impact of Alternative 2 to the past, present, and reasonably foreseeable future actions would not result in a discernable change in peak flows from any change caused by the reasonably foreseeable actions. Implementation of Alternative 2 would not change the risk for peak flow increases in the Soda Creek analysis area. No discernable change in peak flows at or beyond the mouth of Soda Creek would be likely under the cumulative effects scenario; therefore the cumulative effects would not affect streamflows in the South Fork Little Butte Creek.

b. Water Quality

This section discloses the impacts from proposed removal of windthrown trees and fuels treatments on water quality. Soil issues are addressed in the Soils section and aquatic habitat and riparian areas are discussed in the Fisheries section.

Issues/Concerns

Scoping (external and internal) generated the following issue/concern related to implementing the Proposed Action. These effects may or may not occur as a result of the proposed action but were of concern to members of the public or ID team specialists.

- Yarding, log hauling, and prescribed burning activities may impact water quality by increasing sedimentation delivered to streams.

Discussion of Issues/Concerns (Potential Effects) and Related Research

This section provides a short literature review pertaining to the issue identified to be relevant to the implementation of the proposed action and its potential effects on water quality, and sets the stage for the description of the affected environment and subsequent analysis of effects.

Timber harvesting operations have variable effects on sediment production (Everest et al. 1987). A study in Washington State (Rashin et al. 2006) concluded that the primary operational factors that influenced the effectiveness of timber harvest BMPs in controlling sediment delivery to streams were: the proximity of timber falling and yarding activities to streams and particularly whether yarding routes crossed streams; the presence or absence of designated stream buffers; and the use of special timber-falling and yarding practices to prevent direct mechanical disturbances of stream channels. Stream buffer practices were most effective where timber falling and yarding activities were kept at least 10 meters (32.8 feet) from streams and outside of steep inner gorge areas. The overall effectiveness of streamside buffers was diminished by cable yarding routes or skid trails that crossed buffers and streams.

Excluding timber harvest from Riparian Reserves prevents disturbance to stream channels during the felling and yarding operations. Yarding operations can cause extensive ground disturbance in harvested areas; however, cable systems that partly or fully suspend logs generally cause minimal disturbance to the soil surface (Everest et al. 1987). Increased surface erosion can result from ground disturbance and soil compaction caused by tractor logging (Sidle 1979). A buffer width of 100-200 feet is sufficient to prevent most sediment from reaching streams (A.C. Kendig and Cedarock 2003).

The amount of surface erosion generated by slash burning is generally proportional to the severity and extent of the burn (Sidle 1979). Severe broadcast burns on clearcut units in the Oregon Coast Range and western Cascade Range resulted in significant increases in suspended sediment loads for up to 5 years (Sidle 1979).

Most of the increase in sedimentation associated with forestry activities is attributed to forest roads (Sullivan 1985). There are two processes by which roads increase sediment loads in streams: 1) by increasing the incidence of mass failures; and 2) by erosion of the road surface, cut banks, and ditches and subsequent transport of this material to the stream (Duncan et al. 1987). In the Soda Creek analysis area, surface erosion from road surfaces, cut banks, and ditches represents the dominant source of road-related sediment input to streams.

Several studies reporting on sediment movement below forest roads noted the importance of obstructions (including vegetation) on the slope below the road (Seyedbagheri 1996). Slash filter windrows placed at the toe of a road fill have been shown to reduce movement of sediment below fillslopes (Seyedbagheri 1996). Cross drain spacing was also recognized as important as a predictor of sediment movement downslope from logging roads.

A study of soil loss from forest roads in the southern Appalachian Mountains (Swift 1984) concluded that soil loss rates from a non-surfaced roadbed were eight times greater than from roadbeds with six to eight inches of gravel. Vegetation on the cutslope and ditch was shown to be effective in reducing erosion from forest roads in the Oregon Coast Range (Luce and Black 1999). Road segments where vegetation was cleared from the cutslope and ditch produced about seven times as much sediment as road segments where vegetation was retained. Closure of unsurfaced roads during the wet season can also help to reduce erosion (Kattelman 1996).

A review of forest management impacts on water quality concluded that the use of BMPs (see Chapter 2) in forest operations was generally effective in avoiding significant water quality problems; however the report noted that proper implementation of BMPs was essential to minimizing non-point source pollution (Kattelman 1996).

Affected Environment

The 1996 amendments to the Safe Drinking Water Act (SDWA) mandated that state agencies conduct source water assessments for every public water system. A federally-regulated public water system provides water for human consumption through pipes or other constructed conveyances to at least 15 service connections or serves an average of at least 25 people for at least 60 days a year. The states must delineate the groundwater and surface water source areas which supply public water systems, inventory each of those areas to determine potential sources of contamination, and determine the most susceptible areas at risk for contamination.

The project area falls within the source water areas for the Medford Water Commission and the cities of Gold Hill, Rogue River, and Grants Pass. The surface water source for these four public water systems is the Rogue River. Little Butte Creek is a tributary to the Rogue River. The project area is located over 20 miles upstream from the closest public water system intake.

A source water assessment is in progress for the Medford Water Commission and assessments have been completed by the DEQ and the Oregon Department of Human Services for the cities of Gold Hill, Rogue River, and Grants Pass. The completed assessments include an inventory of potential contaminant sources within the source water areas. Grazing animals were identified as a potential contaminant source for the Gold Hill, Rogue River, and Grants Pass drinking water protection areas. No other potential contaminant sources that could occur within the project area were identified in the state source water assessments.

The Oregon Environmental Quality Commission has adopted numeric and narrative water quality standards to protect designated beneficial uses. In practice, water quality standards have been set at a level to protect the most sensitive uses. Cold-water aquatic life such as salmon and trout are the most sensitive beneficial uses in the South Fork Little Butte Creek and its tributaries (ODEQ 2004:5). The Oregon Department of Environmental Quality (DEQ) is required by the federal Clean Water Act (CWA) to maintain a list of stream segments that do not meet water quality standards for one or more beneficial uses. This list is called the 303(d) list because of the section of the CWA that makes the requirement. DEQ's 2004/2006 303(d) list is the most recent listing of these streams (ODEQ 2008a).

The BLM is recognized by Oregon DEQ as a Designated Management Agency for implementing the Clean Water Act on BLM-administered lands in Oregon. The BLM and DEQ have a Memorandum of Agreement (MOA) that defines the process by which the BLM will cooperatively meet State and Federal water quality rules and regulations. In accordance with the MOA, the BLM in cooperation with the Forest Service, DEQ, and the Environmental Protection Agency is implementing the *Forest Service and Bureau of Land Management Protocol for Addressing Clean Water Act Section 303(d) Listed Waters* (USDA and USDI 1999). Under the Protocol, the BLM will protect and maintain water quality where standards are met or surpassed, and restore water quality limited waterbodies within their jurisdiction to conditions that meet or surpass standards for designated beneficial uses. The BLM would also adhere to the State Antidegradation Policy (ODEQ 2008b; 340-041-0004) under any proposed actions.

The DEQ has not determined the Total Maximum Daily Load (TMDL) for the South Fork Little Butte Creek and tributaries. However, a water quality restoration plan (WQRP) for BLM-administered lands in the North and South Forks Little Butte Creek Key Watershed (USDI 2006a) was prepared by the BLM and approved by the DEQ. The DEQ will review the BLM's WQRP upon completion of the TMDL and DEQ may suggest a revision to the WQRP at that time if necessary to comply with the TMDL. BLM recovery goals focus on protecting areas where water quality meets standards and avoiding future impairments of these areas, and restoring areas that do not currently meet water quality standards. In the absence of a completed TMDL, DEQ provided loading capacities for the listed parameters, land management guidance, and shade targets to assist the BLM in their WQRP development (ODEQ 2004). Estimated loading capacities, load allocations, and management targets provided in advance of the TMDL will be examined as part of the TMDL development. DEQ may modify the targets and goals set for BLM if they are found to be insufficient to meet water quality standards.

In advance of a TMDL setting specific numeric targets for the project area, the Oregon statewide narrative criteria found in OAR 340-041-0007(1) (ODEQ 2008b) is the water quality criteria that applies to BLM management.

(1) Notwithstanding the water quality standards contained in this Division, the highest and best practicable treatment and/or control of wastes, activities, and flows must in every case be provided so as to maintain dissolved oxygen and overall water quality at the highest possible levels and water temperatures, coliform bacteria concentrations, dissolved chemical substances, toxic materials, radioactivity, turbidities, color, odor, and other deleterious factors at the lowest possible levels.

The proposed Windy Soda project area is located in the Soda Creek and Deer Creek drainages; both Soda and Deer creeks are included on DEQ's 2004/2006 303(d) list (Table 3-7). Soda Creek is listed for exceeding the summer temperature criterion, and both Soda and Deer creeks exceed the sedimentation criterion. Sedimentation could possibly be affected by the proposed action and will be further discussed in this document. The proposed action would not have any affect on stream temperatures and therefore this topic will not be discussed further in this environmental assessment.

Table 3-7. 2004/2006 303(d) Listings in the Soda Creek Analysis Area and Deer Creek Drainage Area (ODEQ 2008a)

Stream Segment	303(d) List Date	Listed Parameter	Season	Applicable Rule (at time of listing)	Total Miles Affected	BLM Miles Affected ¹
Soda Creek	1998	Sedimentation Temperature	Summer	OAR 340-041-0365(2)(j) OAR 340-041-0365(2)(b)(A)	5.6	5.2
Deer Creek	1998	Sedimentation		OAR 340-041-0365(2)(j)	3.2	1.6

1/ USDI 2006a

The sedimentation loading capacity for Soda and Deer creeks is that amount of sediment coming from all streams upstream of the sedimentation-listed waterbody resulting in <33 percent cobble embeddedness within the 303(d) listed stream (ODEQ 2004:10). DEQ has not determined the sedimentation load allocation for the Little Butte Creek Watershed.

There is no cobble embeddedness data available for Soda or Deer creeks. The Oregon Department of Fish and Wildlife and the BLM do not collect cobble embeddedness data because it is obtained through visual observations and can not be reliably repeated in stream surveys (Smith 2006). The TMDL will develop other appropriate measures, known as surrogate measures, to achieve the loading capacity (USDI 2006a:30). Based on the Applegate TMDL (ODEQ 2003), which is the only Rogue Basin TMDL for sedimentation, it is likely that surrogate measures will be associated with riparian vegetation and roads.

The North and South Forks Little Butte Creek Key Watershed WQRP (USDI 2006a) assumes that measures implemented to meet the temperature TMDL will also meet the likely riparian vegetation surrogate measure targets for the sedimentation TMDL. The Northwest Forest Plan Riparian Reserves would likely be more than that required to meet the percent effective shade targets, but will also provide additional protection from sediments.

Until the DEQ identifies surrogate measures associated with roads, the BLM will continue to utilize compliance with the Aquatic Conservation Strategy (ACS) (USDI 2006a:31) as a surrogate for assessing progress toward achieving goals for water quality on streams within the North and South Forks Little Butte Creek Key Watershed. The ACS for Key Watersheds states that there will be no net increase in the amount of roads in Key Watersheds (USDA and USDI 1994:B-19).

The WQRP's sedimentation recovery goal for roads is to decrease sediment production and delivery from roads (USDI 2006a:38), in part by applying appropriate road BMPs identified in the RMP to minimize soil erosion and water quality degradation (USDI 2006a:38).

Natural or unsurfaced roads, or poorly rocked roads are generally more likely than surfaced roads (well rocked or paved) to contribute sediment to streams. We determined road miles by surface type for all roads on BLM-administered lands and BLM-controlled roads on non-BLM lands within the Soda Creek analysis area (Table 3-8). We obtained the road information from BLM's database in addition to our aerial photo analysis (using 2005 photos) that identified roads not in the database. All roads from the aerial photo analysis and those from the database with an unknown surface type were designated as natural surface for the purpose of analysis.

Table 3-8. Road Miles by Surface Type for BLM-Administered Lands and BLM-Controlled Roads on Non-BLM Lands

Analysis Area	Road Surface Type			Total (miles)	% Natural Surface
	Natural (miles)	Rocked (miles)	Paved (miles)		
Soda Creek	8.3	26.9	7.5	42.7	19%

Roads on BLM-administered lands in the Soda Creek analysis area are stable with no failures present. Road sediment sources are primarily surface erosion from natural surfaced roads and road ditches that connect to streams.

Mass wasting with episodic (“pulsed”) sediment inputs is a major sediment source for Soda and Deer creeks. This was demonstrated during two recent events: the January 1, 1997 flood and multiple storms during December 2005. Major storms during these two periods triggered landslides and debris torrents. The resulting transport of large volumes of water, sediment, boulders, and debris into the stream systems was responsible for major stream channel erosion, especially downstream in the mainstem of South Fork Little Butte Creek during the January 1997 flood. Debris torrents originating in Deer Creek tributaries during December 2005 sluiced out channels and scoured them to bedrock. These types of mass wasting events are natural erosion processes for the South Fork Little Butte Creek area; however, their rate of occurrence can be influenced by management actions such as road construction and timber harvest.

Past Actions

Past ground-disturbing activities such as road building, logging, and livestock grazing contributed sediment to streams in the analysis area. Livestock grazing has occurred throughout the South Fork Little Butte Creek area since the mid 1800s. Large numbers of cattle and sheep were driven from lower valley pastures to high plateau meadows each summer during the mid 1800s to early 1900s. These large numbers of livestock had an adverse impact on watershed conditions, especially along stream courses and near springs and meadows (USDI and USDA 1997). After 1930, cattle became the primary livestock in the South Fork Little Butte Creek area. By the early 1960s, the number of livestock grazing on public lands had been reduced by 50 percent and there has been an additional 50 percent reduction since then (USDI and USDA 1997).

Logging activities started in the late nineteenth and early twentieth centuries, but were limited in scale until the late 1940s (USDI and USDA 1997). During the second half of the twentieth century, large scale intensive timber harvest and road building resulted in increased sediment production. Until the Oregon Forest Practices Act was passed in 1972, yarding was typically accomplished using tractors, even on steep slopes, with little regard for protecting stream crossings. Riparian areas received little protection and ground disturbing activities such as yarding resulted in sediment reaching the streams. Trees were harvested from streambanks leaving little vegetation to prevent the banks from eroding into the streams during high flows. Early forest roads were often poorly designed and located in unstable areas, and road failures provided a major source of sediment. Road design and construction practices improved during the 1980s; however, extensive road building occurred.

The advent of the Northwest Forest Plan in 1994 (USDA and USDI 1994) followed by the Medford District Record of Decision and Resource Management Plan in 1995 (USDI 1995) resulted in major improvements for stream and watershed protection and restoration on federal lands. Riparian Reserves establish protection for all fish-bearing streams as well as nonfish-bearing perennial and intermittent streams, wetlands, lakes, and ponds. Riparian Reserves are adequate to maintain riparian conditions necessary to protect stream shade and restore water temperature over time (USDA and USDI 2005). Over the past 10 years, road construction has declined and road decommissioning and upgrading has increased. Implementation of best management practices during road and logging operations have reduced impacts on water quality. Water quality on federal lands is on an upward trend with reductions in sediment input.

Environmental Consequences

Because no new management is proposed under Alternative 1, the effects described reflect current conditions and trends that are shaped by ongoing management, reasonably foreseeable future actions, and events unrelated to the Windy Soda project. Discussion for Alternative 2 reflects the direct and indirect impacts of the proposed action. Effects discussion also includes cumulative impacts of those direct/indirect actions when added incrementally to actions past, present, and reasonably foreseeable. Short-term effects are defined as those lasting ten years or less and long-term effects last more than ten years (USDI 1994:4-4).

Alternative 1

There are no actions proposed under Alternative 1 (the No Action Alternative); therefore direct and indirect effects are the current conditions in the Soda Creek analysis area which are the result of past actions not related to the Windy Soda project and effects which we expect will occur from identified other on-going and reasonably foreseeable future actions. Alternative 1 describes anticipated effects of not implementing the proposed action at this time.

Under Alternative 1, there would be no change in existing water quality on BLM-administered lands. Soda and Deer creeks would continue to exceed water quality standards. Surface erosion from roads would be expected to remain a concern and the risk of sediment inputs to streams would be expected to remain relatively constant. A minimum level of BLM road maintenance would occur to prevent major sediment input or repair drainage failures.

In the event that a severe, stand-replacement fire occurs in the future (see Fire section) it could reduce or eliminate riparian vegetation, resulting in increased stream temperatures, and expose large areas of bare soil to the erosive forces of rainfall, potentially increasing soil erosion and sedimentation.

Current conditions resulting from past and present actions are summarized as follows. Mass wasting processes such as landslides and debris torrents continue to be the dominant sediment sources in the Soda Creek and Deer Creek areas. Surface erosion from existing roads on all lands contributes to low levels of sediment input primarily at road-stream crossings and where fill slopes closely parallel streams. Streambank trampling from livestock grazing continues to contribute sediment to streams.

Reasonably foreseeable future actions planned for BLM-administered lands in the analysis area include the South Fork Little Butte Creek timber sale, routine road maintenance activities, and continued livestock grazing.

The South Fork Little Butte Creek project proposal includes 675 acres of timber harvest in the Soda Creek analysis area. The potential for sediment from commercial harvest units to reach stream channels is very low due to BMPs that include Riparian Reserves. There would be no new road construction, one new landing, no road renovation, no culvert replacements, and 2.1 miles of road decommissioning that would remove three culverts on perennial tributaries to Soda Creek. The landing would be constructed outside Riparian Reserves and BMPs would greatly limit any sediment moving off-site. Sediment control BMPs governing instream culvert removals would reduce the amount of sediment reaching downstream water sources to the maximum extent practicable. One of the culvert removals could result in sediment reaching Soda Creek, causing localized, limited duration turbidity/sediment increases during and immediately after the culvert is removed. Any sediment resulting from the proposed culvert removal is not expected to be discernible at the mouth of Soda Creek. The culvert removals would provide a long-term benefit to water quality in the tributaries and Soda Creek. Log hauling would adhere to seasonal restrictions. Proposed actions would also include manual pre-commercial thinning (PCT) and prescribed burning. The PCT would not involve any ground disturbance and therefore would not have any effect on erosion rates or sedimentation in the Soda Creek analysis area. Sediment increases from underburning would be very slight given the low intensity burn and BMPs that stipulate no ignition or fire lines in Riparian Reserves. BMPs would reduce to the maximum extent practicable the entry of sediment or ash into stream channels from handpile burning within Riparian Reserves proposed for non-commercial thinning.

Routine BLM road maintenance activities would entail a minimum level of maintenance to prevent major sediment input or repair drainage failures. This work would have a positive benefit to water quality.

Reasonably foreseeable future livestock grazing would likely continue to negatively affect water quality by increasing turbidity/sedimentation through streambank disturbance and riparian vegetation removal. The BLM is developing an environmental assessment (EA) for grazing lease renewals within the Soda

Creek analysis area and Deer Creek drainage area. The grazing lease renewal EA may impose practices that would reduce the impact of livestock grazing on water quality.

There are no reasonably foreseeable future actions for Forest Service-managed lands within the analysis area.

Reasonably foreseeable future forestry operations on private forest lands in the analysis area are assumed to be the same as under the Water Quantity section: no new road construction and an estimated 508 acres of timber harvest. Private forest lands in the Soda Creek and Deer Creek areas would be managed according to the Oregon Forest Practices Act, which was evaluated in 2002 for adequacy in achieving and maintaining water quality goals (ODF and ODEQ 2002). The report indicates that wet-weather hauling and steep-slope ground skidding practices allowed under the Forest Practices Act are not adequate in meeting sedimentation and turbidity standards. The evaluation provided recommendations for improving current practices to have a greater likelihood of meeting water quality standards. Agricultural/rural residential lands would be managed according to county ordinances and also encouraged to reduce water pollution by following suggested practices described in the *Inland Rogue Agricultural Water Quality Management Area Plan* (Rogue Basin Local Advisory Committee and ODA 2005). Management of these lands would be addressed in DEQ's Water Quality Management Plan (WQMP) for this area scheduled to be completed by Spring 2009 (Meyers 2007). Conforming to the WQMP should ensure achievement of the TMDLs by private land owners.

In conclusion, past actions from the 1850s to the 1980s on both private and federal lands throughout the analysis area contributed to water quality degradation, specifically sediment increases. With the cessation of some activities, such as intensive cattle and sheep grazing, and the moderation of impacts from other activities, such as logging and road building, water quality conditions are improving. On private forest lands, natural surface roads that are used during the wet season and ground skidding on steep slopes would likely continue to have erosion concerns and contribute sediment to nearby streams. Reasonably foreseeable future actions on private lands would be required to adhere to the TMDLs and WQMP upon their completion by DEQ and water quality in the analysis area would be expected to continue to improve. Reasonably foreseeable future livestock grazing would likely continue to cause increases in turbidity/sedimentation.

Alternative 2

Under Alternative 2, proposed road maintenance, log hauling, yarding of logs to roads/landing sites, and fuels treatment activities would have the potential for increasing the amount of sediment delivered to streams in the analysis area. The vast majority of the proposed action would occur in the Soda Creek analysis area, with only four ridgetop acres of yarding and fuel treatments and 0.3 miles of log hauling on a rocked road near the ridgetop in the Deer Creek drainage area.

Road maintenance proposed under Alternative 2 would include cleaning debris from road surfaces and drainage ditches; reestablishing ditchlines; clearing plugged culverts, and some blading of the road surfaces in spots to correct road surface damaged caused by blowdown or logging. Road maintenance would ensure that designed drainage patterns are functioning as intended and would reduce the risk of road failure due to water pooling behind plugged culverts or saturating the road surface. All road work would be done during the dry season (see Chapter 2 PDFs) to prevent or minimize sediment delivery to streams to the maximum extent practicable. There is a slight chance that proposed road work near streams could increase sedimentation rates during the first significant fall rain event. The timing of the sedimentation increase would coincide with normal high sediment levels that typically occur during high rainfall events. It is expected that sediment/turbidity levels resulting from the proposed road work would not be detectable at the mouth of Soda or Deer creeks.

Sedimentation as a result of log truck travel on roads in the analysis area would be very low due to the existing road surfacing, proposed dust abatement, and BMPs for seasonal hauling restrictions. Haul roads

are either rocked or paved except for approximately 0.8 miles of natural surface road that accesses two units.

The potential for sediment to reach stream channels as a result of yarding operations is very low due to erosion prevention BMPs (Chapter 2) such as no salvage or yarding in Riparian Reserves and limiting the extent of skid trails. Waterbars on tractor skid trails would prevent water from concentrating on bare, compacted ground and move it to adjacent vegetated or slash covered areas. Soil that moves on cable yarding corridors during storm events would be trapped by logging slash or by ground cover on undisturbed ground at the bottom of or adjacent to yarding corridors. On steeper slopes with higher erosion potential, waterbars would be constructed manually to direct water off the cable yarding trails.

Fuels treatments would consist of handpiling and burning the material remaining after salvage, logging and scattering, and underburning. The no treatment buffers (Chapter 2) would apply to piling and burning and would reduce the movement of sediment or ash into stream channels to the maximum extent practicable. Any increases in sediment or ash to waterbodies as a result of pile burning would be very slight and not expected to be detectable in the mainstems of Soda or Deer creeks.

Underburns would be conducted only when a light or moderate burn can be achieved (spring-like conditions when soil and duff are moist). Underburning under these conditions would result in a low intensity burn with minimal duff consumption. Sediment increases from underburning would be very slight given the low intensity burn and BMPs that stipulate no ignition or fire lines in Riparian Reserves. Vegetation and down material in Riparian Reserves would trap any off-site soil and ash movement and greatly reduce the likelihood of it entering stream channels.

There is no potential for sediment delivery to streams in the Deer Creek drainage area as a result of the Windy Soda project because:

- 1) the units are located on a ridgetop with no connectivity to surface water;
- 2) the 0.3 mile road segment that would be used for hauling in the Deer Creek drainage area is rocked and the closest stream channel is a dry draw which is over 170 feet away.

Alternative 2 would have minimal adverse effects on sedimentation in the Soda Creek analysis area because:

- 1) road maintenance would decrease sediment delivery potential;
- 2) no log hauling would occur during the wet season;
- 3) the potential for sediment from salvage units to reach stream channels is very low due to BMPs, including Riparian Reserves;
- 4) piling and burning would be conducted outside of riparian no treatment buffers; and
- 5) underburning would be result in a low intensity burn with BMPs that stipulate no ignition or fire lines in Riparian Reserves.

“Minimal adverse effects” means actions would not result in the listing of streams as water quality limited. Soda and Deer creeks are on the 2004/2006 303(d) list for sedimentation. Implementation of erosion prevention and sediment control BMPs would reduce the amount of sediment reaching these listed waterbodies to the maximum extent practicable.

The Medford District PRMP/EIS (USDI 1994) acknowledges that surface-disturbing activities under the PRMP alternative could result in increased turbidity and sediment levels and that these increases would adversely effect water quality and could impair beneficial uses such as fish and domestic water use (USDI 1994:4-18). Any adverse effects of turbidity or sedimentation on water quality resulting from Alternative 2 would be within the scope of what was analyzed in the PRMP/EIS.

Existing human-caused sediment sources in the analysis area are primarily related to the road network created by past actions. The incremental impact of Alternative 2 on sedimentation in the analysis area would be immeasurable compared to the sedimentation contributed from past, present, and reasonably

foreseeable actions as described under Alternative 1. Implementation of proposed erosion prevention and sediment control BMPs would reduce to the maximum extent practicable the amount of sediment moving offsite and into a stream channel.

3. What is the potential for impacts to aquatic habitat and fish?

The proposed Windy Soda Salvage project would occur within the Little Butte Creek Watershed, primarily within the Soda Creek catchment. Several proposed units slope over the ridge and into the adjacent Deer Creek drainage area. The Little Butte Creek Watershed above the North and South Fork confluence is a designated tier 1 key watershed under the Aquatic Conservation Strategy (ACS) of the Northwest Forest Plan, and supports relatively high populations of at risk anadromous (ocean migratory) fish.

Native anadromous species which occur in the watershed include chinook salmon (*Onchorynchus tshawytscha*), federally listed “threatened” Southern Oregon Northern California (SONC) coho salmon (*O. kisutch*), bureau sensitive summer and winter steelhead trout (*O. mykiss*), and pacific lamprey (*Lampetra tridentata*). Native resident fish include rainbow (*O. Mykiss*) and cutthroat (*O. clarkii*) trout, and sculpin (*Cottus* spp.). Many non native fish have been introduced into the watershed, though these species are largely present only in stream reaches many miles downstream of the planning area.

Within the analysis area, the South Fork of Little Butte Creek, Deer Creek, and Soda Creek support fish, and all three streams include reaches designated as Coho Critical Habitat (CCH) and Essential Fish Habitat (EFH), under the Endangered Species and Magnuson Stevenson Fisheries acts, respectively.

Aquatic habitat within the planning area has been impacted by many past activities, most notably among them timber harvest, road building, and livestock grazing. The primary impact from these activities is manifested as increased sedimentation and turbidity to aquatic habitat (see Water Resources Section). Timber harvest, including salvage operations, has the potential to adversely affect aquatic habitat. Disturbed soils, such as those created by tractor and cable yarding, can be displaced during precipitation events, washed downslope, and if hydrologically connected, deposited into drainage channels, resulting in increased sedimentation and turbidity. This sediment can fill in pools, cover spawning gravels, and smother eggs. Reduced substrate availability and complexity may decrease the diversity and quantity of aquatic organisms, upsetting the ecological balance of the stream system. Increased turbidity from high sediment amounts can disrupt feeding and territorial behavior of juvenile salmonids, which can lead to decreased growth rates and increased mortality (Meehan 1991).

Increased openings in forest canopy created by road and landing construction and harvest of live trees has the potential to alter hydrologic processes, such as increasing peak flows, changing the timing of peak or base flows, and increasing the likelihood of uncommon events, such as debris torrents. Peak flow increases and debris torrents can dramatically alter aquatic habitat, as stream channels must adjust to accommodate greater volumes of water. Given the amount of past timber harvest and area covered in roads, it is reasonable to assume that hydrologic processes in the planning area have been altered as a result of past actions (Water Resources, Water Quantity Section).

Increased summer stream temperatures have resulted from reduced riparian cover and impounded water bodies (cattle watering ponds, pump chances, trampled springs, etc.) as well. As a result of past and continuing impacts to habitat, both the South Fork of Little Butte and Soda Creeks are listed as water quality limited for exceeding both temperature and sedimentation standards set by the Oregon Department of Environmental Quality, and Deer Creek is listed as well for sediment (see Water Resources, Water Quality Section). Despite these habitat limitations, the Little Butte Creek Watershed, including the South Fork, is among the most productive salmonid producers in the entire Rogue Basin.

Alterantive 1, No Action Alternative: Should the no-action alternative be chosen, there would be no ground disturbance of any sort related to salvage of downed timber, and hence no additional disturbances to any fish or aquatic habitats beyond baseline conditions.

Alternative 2, Proposed Action Alternative: The action alternative proposes to salvage blown down timber in stands that were relatively recently entered under previous timber sales. No new road or landing construction is proposed. The elements of this proposed salvage that have potential to impact aquatic habitat are the falling of standing trees, yarding of logs to roads/landing sites, rehabilitation of yarding corridors, hauling of the logs off site, and follow up fuels treatments. Applicable Project Design Features (PDFs) incorporated into this project primarily to protect aquatic resources include: No salvage would be allowed in Riparian Reserves; fuels treatments would not occur within riparian buffers, all tractor yarding would be limited to the dry season, and would utilize existing skid trails where possible; hauling timber would not be allowed during the wet season; and tractor and cable corridors would be water bared after use (see Chapter 2, Project Design Features).

Falling standing trees could lead to greater increases in canopy openings, potentially altering hydrologic processes due to increased snow retention (see hydrology discussion, this document). However, very few standing trees (only those root-sprung and likely to fall over in the near future and designated as a hazard tree) would need to be felled to accomplish the proposed salvage. Falling a few standing trees scattered amongst many units would not result in a change of canopy cover enough to measurably affect peak flows (see Water Resources, Water Quantity Section). Hence, this element of the salvage would have no effect to fish or aquatic habitat.

No yarding would be allowed within Riparian Reserves. The vegetative buffers between stream channels and yarding corridors would exist undisturbed to capture any sediment mobilized off of disturbed ground (yarding corridors) and routed downslope. Because of this, and as dry draws would not be used as yarding corridors, there would be no direct hydrologic connectivity to stream channels from any yarding operations. Indirect connectivity would exist only where tractor skid trails would connect with a road located downslope of the unit; routed water and displaced sediment from the trails could potentially be transported to aquatic habitat via the road or ditch. However, tractor yarding would only occur on relatively flat ground, so the potential for off site sediment transport would be low. Furthermore, yarding trails and corridors would be water-barred, which would serve to hydrologically disconnect them from downslope roads and ditches. Any routed water and displaced sediment would be diverted off the trail and into adjacent vegetation on the forest floor, before reaching the road/ditch system. For these reasons, yarding operations are not anticipated to contribute sediment to aquatic habitat.

Tractor yarding corridors (skid trails) would use existing trails to the extent possible, and maximum area in compacted ground (skid trails, roads, landings, etc.) for any unit would not exceed 12% of the total area (see PDFs), a threshold suggested that if compacted surface area remains below, no detectable effects to flows occur (Harr 1975). Hence, yarding operations would not measurably affect stream flows. Because flows would not be affected, and as sediment would not be contributed to channels, yarding operations (including follow up rehabilitation) would have no effect to fish or aquatic habitat.

Timber hauling has the potential to introduce sediment to stream channels as repeated use of non-paved roads can break down surface material to small particulate sizes that are easily transported from the road system to stream channels during precipitation events, via the road surface or a parallel ditch. These inputs can occur at any point where a road and stream intersect. Properly engineered roads incorporate drainage features that enable the road and ditch systems to discharge much of the captured and routed water and transported sediment, into downslope vegetation where it can be filtered to the forest floor before crossing a channel. Within the planning area, there would be roughly 15 miles of unpaved haul routes, totaling an estimated 12 stream crossings, all but one of which would be well upstream of fish bearing channels. Salvage units and haul routes are wide spread throughout the planning area. Roughly 200 to 300 log truck loads would be required to haul out the estimated 1 million board feet of timber proposed to be salvaged (personal communication with J. Samuelson). Given the location and size of proposed units in relation to haul routes, it is unlikely that any given non-paved route would have more than 50 loads come down it. The main artery for the planning area is paved (Conde Creek Rd), and as such not vulnerable to erosion induced by increased use.

Given that haul routes are wide spread and generally located in upland areas, that haul would only be allowed during the dry season, that there would be only 12 stream crossings distributed widely around the planning area, and that the number of loads to come off of any one non-paved haul route are relatively low, there is very little likelihood that this element would result in a detectable increase in sediment to aquatic habitat (also see Water Resources, Water Quality Section). Any haul generated sediment that would migrate into stream channels before being diverted into downslope vegetation by drainage structures during a precipitation event, would be a small amount that would be assimilated into, and undetectable beyond background conditions.

Fuels treatments would leave riparian buffers, require minimal ground disturbance, and would not treat large trees. All check lines would be water barred and rehabilitated after ignition operations were completed. Canopy levels would not be reduced by treatments, nor would ground compaction increase; hence peak flows would not be affected (see Water Resources, Water Quantity Section). The only effect fuels treatments may have to aquatic resources is a possible increase in ground water storage and subsequent release to streams throughout the dry season. However, any extra water available is likely to be utilized by remaining vegetation before entering stream channels. For these reasons, fuels treatments would have no effect to aquatic resources.

Summary

The only element of the proposed Windy Soda salvage that has any potential to affect aquatic habitat is log haul. However, the amount of sediment potentially generated by haul that would migrate to aquatic habitats is so small as to be undetectable, and to occur at such a time (precipitation event) to be biologically insignificant to aquatic habitat. As such, implementation of the Windy Soda salvage would have no effect to fish (including listed SONC coho salmon), fish habitats (including designated CCH and EFH), or upstream aquatic habitats. Because all elements of this project would result in no effect, or an undetectable effect, it would not add cumulatively to habitat degradation resulting from other past and ongoing activities impacting the watershed. Aquatic Conservation Strategy (ACS) objectives would not be compromised at any spatial scale of analysis (see attached appendix ACS).

Aquatic Conservation Strategy Consistency

The Northwest Forest Plan's (NWFP) Aquatic Conservation Strategy (ACS) has four components: Riparian Reserves, Key Watersheds, Watershed Analysis, and Watershed Restoration. It is guided by nine objectives which are meant to focus agency actions to protect ecological processes at the 5th-field hydrologic scale, or watershed, at the 6th and or 7th fields (subwatershed and or drainage), and at the site level. In this case, Deer Creek is a 7th field (drainage) and Soda Creek a 6th field (subwatershed) within the larger South Fork Little Butte Creek subwatershed. All of these are tributaries to the much larger Little Butte Creek 5th field Watershed. How the four components of ACS relate to the Windy Soda salvage is explained below:

1. Riparian Reserves: Riparian Reserve widths for streams, springs, wetlands, and unstable soils have been determined according to the protocol outlined in the NWFPs Aquatic Conservation Strategy and are listed in the PDFs for the Windy Soda salvage.
2. Key Watersheds: Tier 1 Key Watersheds contribute directly to conservation of at-risk anadromous salmonids, bull trout, and resident fish species. They also have a high potential of being restored as part of a watershed restoration program. The Little Butte Creek Watershed is a designated Key Watershed, above the confluence of the North and South Forks, for anadromous salmonids.
3. Watershed Analysis: BLM completed the Little Butte Creek Watershed Analysis in 1997. The analysis covers the planning area.

4. Watershed Restoration: Most of the restoration activities in the watershed have focused on restoring and facilitating fish passage to provide better access to habitat on private and federal lands. Projects by the local watershed council, ODFW and/or BLM include culvert removal and replacement, dam removal, road decommissioning, and irrigation ditch fish screens and siphoning.

Evaluation of This Action's Consistency with Northwest Forest Plan Aquatic Conservation Strategy Objectives

1. Maintain and restore the distribution, diversity, and complexity of watershed and **landscape-scale features** to ensure protection of the aquatic systems to which species, populations and communities are uniquely adapted.

Blow down events periodically occur within watersheds and across the landscape, and in fact may be beneficial to aquatic systems as they may facilitate recruitment of large wood by stream channels. No salvage would occur in Riparian Reserves, and salvage of blown down trees outside of riparian areas would not affect aquatic systems at any spatial scale.

2. Maintain and restore **spatial and temporal connectivity** within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.

No elements of the proposed salvage would have any mechanism to influence this objective at any spatial scale.

3. Maintain and restore the **physical integrity** of the aquatic system, including shorelines, banks, and bottom configurations.

No elements of the proposed salvage would have any mechanism to influence this objective at any spatial scale.

4. Maintain and restore **water quality** necessary to support healthy riparian, aquatic and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.

The only element of the proposed salvage with potential to affect water quality is log haul. However, given the limited amount of haul, the season in which it would occur, and that there area relatively few stream crossings, affects would not be measurable at the drainage or watershed scales (see Water Resources, Water Quality Section). Minute site level (i.e. one pool below each crossing) increases are possible, but these would be of insufficient magnitude to affect the integrity of the aquatic system.

5. Maintain and restore the **sediment regime** under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage, and transport.

See element #4. Minute site level inputs would not compromise further the sediment regime of the aquatic ecosystems within the project area.

6. Maintain and restore **instream flows** sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high, and low flows must be protected.

Peak flows and summer low flows would not be affected by the salvage sale. Canopy levels would not change significantly as compared to existing conditions, and new compaction would be kept below critical thresholds for affecting flows.

7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in **meadows and wetlands**.

No causal mechanism exists between any element of the proposed salvage sale and this objective. It would not be affected at any spatial scale.

8. Maintain and restore the species composition and structural diversity of **plant communities in riparian areas** and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of **coarse woody debris** sufficient to sustain physical complexity and stability.

No activities are proposed within Riparian Reserves, hence no casual mechanism exists to influence this objective at any spatial scale.

9. Maintain and restore **habitat** to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.

See objectives # 4 and 5. Site level inputs of sediment would of too small a magnitude to measurably degrade aquatic habitat.

4. What is the applicability of the studies *Biogeochemical Consequences of Wind and Salvage-Logging Disturbances in a Spruce-Fir Forest Ecosystem* (del Rio and Wessman, incomplete) and *Changes in Understory Composition Following Catastrophic Windthrow and Salvage Logging in a Subalpine Forest Ecosystem* (Rumbaitis del Rio 2006) to the Windy Soda Salvage Project?

Commenters submitted studies by del Rio and Wessman (incomplete), *Biogeochemical Consequences of Wind and Salvage-Logging Disturbances in a Spruce-Fir Forest Ecosystem* and *Changes in Understory Composition Following Catastrophic Windthrow and Salvage Logging in a Subalpine Forest Ecosystem* (del Rio) an suggested that BLM analyze the Windy Soda Salvage project in context of their findings.

The University of Colorado article entitled, *Salvage logging does more harm than good, according to new CU-Boulder study* (Scott 2003) cited in this comment refers to the wind event occurring in one of Colorado's spruce-fir forest ecosystems:

On October 25, 1997, an intense landscape wind disturbance occurred on the west side of the Continental Divide, north of Steamboat Springs, Colorado, on the Medicine Bow-Routt National Forest. The wind caused extensive blowdown to a twenty mile long belt of Engelmann spruce and subalpine fir timber in a band over four miles wide. The blowdown as been mapped as affecting approximately 25,000 acres with approximately 8,000 of those acres located within the Mount Zirkel Wilderness.

The del Rio report and the unfinished del Rio and Wessman report both study soil productivity in a single blowdown in a Colorado subalpine spruce/true fir forest ecosystem. The del Rio and Wessman report is not completed and not published. The article cited in the comment ends with "we hope to determine if salvage-logged areas have trouble regenerating after the fire compared to unlogged blow-down areas." Of the two studies referenced in response to BLM's Salvage sales, the del Rio and Wessman study is still ongoing and incomplete, has no conclusive findings, and is yet to be submitted, peer reviewed, and published. The Wessman Research Group website also discloses that this study is incomplete (<http://cires.colorado.edu/science/groups/wessman/projects/disturbance/index.html>) and it is not included in the CIRES page showing the list of Wessman's publications

(<http://cires.colorado.edu/people/wessman/>) or in Wessman's U of C Faculty and Research page (http://www.colorado.edu/eeb/faculty/fac_wessman.html). Without a completed, published, and peer reviewed manuscript, any outside conclusions are mere speculation.

The 2006 del Rio report, however is published. The article cited in the comment states that the U.S. Forest Service officials opened up areas outside of the wilderness to salvage logging operations in 1999-2001 in hopes of accelerating forest regrowth. This was the purpose of the narrowly focused soil study in Colorado. Their objective differs from Ashland's Windy Soda Salvage project which is harvesting blowdown timber to recover economic values and produce timber products consistent with the 1995 Medford District RMP, Timber Resource objectives (RMP p. 72-73 and Chapter 1, Purpose and Need). Timber salvage and subsequent fuels treatments will also mitigate fire hazard created by the blowdown event.

The geographic area within Colorado's harsh subalpine spruce/fir forest ecosystem, studied in the completed del Rio report, contains the following concession: "Clearly, more research is needed on the long-term dynamics of this system to determine if salvage logging will result in different patterns of succession" (Rumbaitis del Rio 2006). In the publication the author admits that control and blowdown plots were located at a lower elevation than salvage-logged plots. For this reason the paper concludes with, "Finally, results presented here must be interpreted with caution because elevation differences between blowdown and salvage-logged treatments may amplify observed treatment differences" (Rumbaitis del Rio 2006).

There are significant differences in the climatic, plant and soil regimes in the study area and the Windy Soda area. The study was conducted in windblown areas of subalpine fir / spruce forests in northwestern Colorado. The Routt Divide Blowdown occurred in elevations from 8,000 to over 12,000 feet in a subalpine spruce-fir environment. Windy Soda occurs between 2,680 and 4,640 feet elevation. A Routt County Climate information site discloses that

"All of Routt County is at a relatively high elevation. Having less of an atmospheric column between the surface and the top of the atmosphere leads to more intense sunshine at ground level, which is a benefit when it contributes to our thermal comfort while outside, but also increases our exposure to ultraviolet (UV) radiation" (<http://yampavalley.info/weather0027.asp>).

Furthermore, the Routt Divide Blowdown soil component "are derived from Precambrian granites, gneiss, and glacial deposits (Snyder et al. 1987) and are classified as typic Cryochrepts and Dystrocryepts" (Rumbaitis del Rio 2006). However, the soils series identified in Windy Soda are Bybee, Farva, McMullin, McNull, Medco, Tatouche and Woodseye. Because of the striking differences between southwest Oregon's Windy Soda and subalpine Colorado's Routt Divide Blowdown soil composition, a narrowly focused highly sensitive soil study from one are not applicable to the other.

The comparison of Colorado's subalpine spruce-fir forest ecosystem cannot be fairly applied to southwest Oregon's dry Douglas-fir mixed conifer lands. Nor can the scale of the 20,000 acre (Snook, 1999) Routt Divide Blowdown be fairly compared to the 413 scattered acres of Windy Soda. The Routt Divide Blowdown devastation removed crown cover over a 150 square mile area

(<http://www.wilderness.net/index.cfm?fuse=NWPS&sec=wildView&WID=391>) and therefore would result in a greater radiant surface heating than Windy Soda, which in comparison, comprises 413 acres of scattered patches across 6 square miles of federal land.

5. How does timber salvage, and the timing of salvage, contribute to the potential for increased bark beetle activity in the project and surrounding area?

The blowdown area studied by del Rio and del Rio and Wessman does however share some common ground with other blowdown areas. One similarity is the potential for beetle outbreaks to occur among fresh blowdown as was evident in the Routt Divide Blowdown bark beetle epidemic that occurred directly

behind the blowdown event used in the del Rio studies. This significant ecological event, however, was not mentioned in either of the two abstracts cited.

The article, which cites the University of Colorado study, concludes that salvage logging slows recovery of pioneer species. However, the article and study fails to acknowledge what occurred in the unsalvaged portions of the blowdown area and the larger landscape level effects that followed where no salvage logging occurred.

The University of Colorado research narrowly focuses on only one variable of subalpine forest ecosystem – soils. A subsequent bark beetle infestation, several wildfires, and larger ecological ramifications of the Routt Divide Blowdown was not included in the published study, but evidently occurred.



Routt Divide Blowdown. Photo courtesy U.S. Forest Service.

According to the Biological Evaluation of Spruce Beetle and Mountain Pine Beetle for the Hahns Peak/Bears Ears and Parks Ranger Districts, Medicine Bow – Routt National Forests, 2000 and 2001, bark beetle populations erupted in unsalvaged portions of the Routt Divide Blowdown:

“The spruce beetle situation has changed significantly in the past two years. In 2000 and 2001, spruce beetle populations relocated from blowdown into standing green trees. This has resulted in a large amount of spruce mortality at far higher levels than those observed since at least 1994. Small areas of standing spruce mortality increased in size and intensity, growing into small outbreaks. Localized spruce beetle outbreaks grew significantly as well. The magnitude of spruce beetle population increase within windthrow was greater than expected, as measured by the huge increase in killed trees once the spruce beetles moved from windthrow into standing trees. . . Outbreaks range in size from groups of infested trees within a stand to entire stands containing thousands or possibly tens of thousands of infested trees. A large-scale spruce beetle outbreak has begun in the analysis area because two necessary conditions have been met --- susceptible forest conditions and lots of spruce beetles. The triggering event that has allowed spruce beetle populations to enlarge and take advantage of this susceptible condition was the Routt Divide Blowdown. Continued windthrow and the presence of diseased and damaged trees provide additional host material for spruce beetle populations to increase. . .

This extensive blowdown has triggered a rapid population increase of spruce beetle in fallen spruce trees. There was considerable risk that beetles emerging from windthrown spruce would infest standing, healthy spruce once the windthrown trees became unsuitable for colonization. Spruce beetle populations have moved from blowdown to infest standing trees.

In addition, mountain pine beetle populations are in outbreak status in several areas adjacent to the assessment area. Mountain pine beetle populations are rising within the assessment area.”

The seriousness of the epidemic was emphasized again in another report:

“Recent blowdown events and susceptible forests in Wyoming and other parts of Colorado are facilitating spruce beetle outbreaks across the region, especially adjacent to the assessment area in the Hahns Peak/Bears Ear and Parks Districts of the Routt National Forest (Schaupp et al. 2002). The bark beetle epidemics have the potential to reach landscape scale and kill most of the older mature spruce over the west slope of the Rocky Mountain Region over the next 10-15 years” (USDA 2002).

The local concern is to minimize beetle outbreaks and avoid the conflagrations witnessed in the subsequent years following the Routt Divide Blowdown. Most conifer species have at least one associated bark beetle that is capable of killing the tree under the right conditions. Those bark beetles that infest live trees are fairly opportunistic and usually require their hosts to be under some form of physiological stress for colonization to be successful. One of the typical agents of stress include the physical agent of wind damage which lowers the natural defenses of standing trees and whose blowdown provides available food source for beetle populations to aggregate and breed.

In western Oregon, bark beetles thrive on fresh windthrow, which is their food source. Available food source is the ultimate regulator of bark beetle populations. When food sources are high, beetle populations likewise build up to high levels. When populations build up they can attack and readily kill standing trees causing epidemics as witnessed in the Blue Mountains of eastern Oregon. Bark beetle epidemics can cause widespread destruction and alter the ecosystem from its current species composition and stand structure.

According to Oregon Department of Forestry (ODF) Forest Health Unit, Douglas-fir is the most susceptible species in Oregon to bark beetle outbreaks after large disturbance events. Populations of Douglas-fir beetle build up in down trees and spread to attack live standing trees. Spread to nearby standing trees occurs especially when down or weakened host material is abundant. According to the Oregon Department of Forestry, three or more down trees per acre is sufficient to produce Douglas-fir beetle populations capable of successful attacks on standing green trees and producing losses between 30-60% of the blowdown volume (ODF Forest Entomologist). Beetle populations can build to high levels in blowdown events. Susceptibility of Douglas-fir to bark beetle damage is related to tree sizes exceeding 14 inches diameter and stand density, diversity, and condition. ODF Forest Health Unit aerial surveys indicate that tree mortality often follows significant storm events; however, salvage can capture value and increase protection of older stands.

Douglas-fir beetle populations build up within the first 1 to 2 years of the event. According to Schmitz and Gibson (1996):

“Prompt salvage of blowdown or currently infested trees will also help forestall epidemics. . . The most desirable management approach, therefore, involves prompt detection of blowdown or other stand disturbances, timely removal of threatened or infested trees, and maintenance of a vigorous stand. . . remove trees injured by wind, disease, and other agents . . . Successful preventive practices must also include salvage of windthrown or infested trees before beetle broods emerge from them”.

According to the Southwest Oregon Forest Insect and Disease Service Center, because damaged hosts (fire kills, windthrown trees, broken trees, logging slash) are very important in the population dynamics of these beetles, it is important to salvage such material promptly to avoid infestation of surrounding trees. Leaving blowdown timber untreated could increase the threat of Douglas-fir beetle and pine engraver beetle infestations.

“Typically, major fires, large wind storms, or extensive amounts of tree breakage associated with especially heavy snow falls will lead to greatly elevated populations of Douglas-fir beetles because of the large amounts of preferred habitat that suddenly become available with such events. Beetle populations that build up in the downed or injured trees can then infest nearby green trees” (Southwest Oregon Forest Insect and Disease Service Center).

Under Alternative 1, no salvage would occur in the Windy Soda project area. Downed trees provide habitat for bark beetles to aggregate and breed. With an abundant food source, bark beetle populations could build to high levels. The project area and surrounding forest stands would remain at a higher risk for subsequent bark beetle outbreaks in comparison to Alternative 2. Although it is difficult to predict the exact timing, extent, or severity of a bark beetle outbreak, the potential impacts of bark beetles if the salvage of blowdown does not occur are long known, have been repeated in several scientific reports, journals, and leaflets, and have long-standing application (Furniss, 1979; Furniss et al., 1981; LeJeune, et al., 1961; McMullen and Atkins, 1962; Holsten et al. 1989; Schmid and Frye, 1977; Dolph, 1965; Livingston, 1979; Ross and Daterman, 1994; Schmitz and Gibson, 1996).

Under Alternative 2, salvaging would remove large downed wood in excess of what is needed to meet coarse woody material (CWM) requirements and subsequent fuels treatments would reduce the availability of small diameter material by hand piling and burning or lopping and scattering slash into open areas. Under Alternative 2, host material would be reduced as soon as practicable to avoid build-up of beetle populations reducing the potential for a substantial bark beetle outbreak by salvaging downed susceptible host trees. Ground-based logging may cause root damage or scarring of residual trees potentially stressing trees and making them more susceptible to bark beetle attacks. However, damage can be prevented or minimized with required project design features including the use of predesignated skid trails (using existing skid trails to the extent possible) and on-site contract administration. BLM contract administrators and inspectors monitor the daily operations of contractors to ensure that contract specifications are implemented as designed. If work is not being implemented according to contract specifications, contractors are ordered to correct any deficiencies. Timber sale contract work could be shut down if infractions of the contract are severe. The contract violations would need to be corrected before the contractor would be able to continue work or timber harvest. If contract violations are blatant, restitution could be of a monetary value of up to triple the amount of damage.

Commenters also submitted references from Schowater (1995), Black (2005), and Franklin et al. (1989) for consideration in the context of the analysis of the Windy Soda Salvage project.

Schowater 2005 studies canopy arthropod communities and harvest practices in western Oregon. Except for an occasional hazard tree, to be removed upon supervisory review in accordance with OSHA Standards (USDL 1995), the Windy Soda project does not plan any green tree removal that would alter the forest canopy. The objective of the Windy Soda Salvage project is to recover windthrown trees.

The report *Logging to Control Insects: The Science and Myths Behind Managing Forest Insect Pests* (Black 2005) submitted by commenters with the suggestion that scientific controversy exists concerning logging to influence insects and disease. The Black Report was reviewed by Forest Health Protection Entomologists from Region 6 of the U.S. Forest Service in November 2005, who concluded that the report contained many erroneous statements that were not even supported by the report’s cited literature and included many citations taken out of their proper context. Forest Service Forest Health Protection specialists caution analysis teams to refer directly to the appropriate peer-reviewed literature rather than popular review reports such as the Black Report. The Black report was also reviewed by BLM silviculturists who concur with the findings reported by Region 6 Forest Service entomologists.

Commenters submitted a reference from Franklin et al. (1989) claiming that “disease and insect problems may be worse in managed stands than in natural stands”. This is a very general comment and appears to be related to a position or opinion as to whether to manage forests or leave them in natural conditions.

6. What is the potential for increased fire hazard?

Fuels, fire and other disturbances, topography, and weather are fundamental factors influencing wildfire intensity and severity, which shape the stand structure and function of forests across the landscape (Graham, et al. 2004). The recent blow down event has modified the forest structure and composition, increasing surface fuel loading in the project area. The amount and distribution of the blow down and associated fuel loading varies; in some units the fuel loading is more concentrated, and in other areas the blow down timber and associated fuels are scattered. The Windy Soda salvage units occur in an area that was previously thinned and treated to reduce post harvest fuel loading. In proposed treatment units 30-2, 30-3, 31-3, and 31-7 (an estimated 146 acres) the fuel models were changed from a fuel model 8 (light timber litter) to a fuel model 11 (logging slash), which in turn would create higher rates of fire spread, greater flame lengths, and more resistance to control in the event of a wildfire. For the remaining units the fuel loading is described as a fuel model 8.

Under Alternative 1, the No-Action Alternative, the 1 to 3 inch diameter fuel loading would continue to contribute to a potential for a higher rate of fire spread, greater flame lengths, and more resistance to control in the event of a wildfire. Larger diameter fuels would contribute to longer burn time duration and increased burn severity. Large burning material can also increase fire suppression complexity. Firefighters are exposed to increased safety risks and hazards with a heavier fuel bed. For example, a bulldozer may not be able to push large down trees aside to create fireline without sending people ahead with chainsaws to buck up the trees into smaller sections. This increases the safety hazards during fire suppression efforts. If the heavy fuels (large woody material) prevent using safe fire suppression tactics, fire managers are more likely to use indirect versus direct attack suppression strategies. Indirect suppression tactics, such as air tanker fire retardant drops are less effective in heavy fuels than lighter fuels. The result of indirect fire suppression tactics can result in more area burned, more emissions released, and increased burn severity (i.e., tree mortality, soil damage, etc.), during a wildfire event. The increased complexity of fire suppression can increase the resources needed to contain a fire. More resources (and extended suppression time/days) will contribute to increased fire suppression costs.

The Routt Divide Blowdown as chronicled in articles submitted by commenters (see Sections 4 and 5 above) contributed to wildfire severity and complicated subsequent wildfire suppression efforts. The excessive unsalvaged material left on the ground contributed to carrying fire during subsequent fire seasons. The Craig Interagency Dispatch Center Year-End Report 2001 reports the following:

“The Mad Creek fire, which burned 1,270 acres in the blowdown on the Routt National Forest, is also one that will live in infamy. It started on July 8th and was declared out on December 1. Three Type III Teams and a Type II Team have managed it. It has survived several drenching rain events adding to the complexity involved with suppressing it.”

In 2002 the Craig Interagency Dispatch Center Year-End Report read where the Routt Divide Blowdown burnt again:

“Another noteworthy first is the fact that the Forest burned more acres than the other agencies combined. The largest of these was the Mt. Zirkel Complex consisting of the Burn Ridge fire and the “never say die” Hinman fire. Both of these fires exhibited extreme fire behavior and crossed over the Continental Divide (another first), thus precipitating the Type 1 team order. It proved to be a logistical challenge, at one point requiring a camp set up on both sides of the divide. Also adding complexity to the logistical function was the fact that a large portion of the complex was in wilderness area and the blowdown (déjà vu Mad Creek?).”

While the 413-acre Windy Soda Project Area cannot be compared to the 20,000-acre Routt Divide Blowdown and subsequent wildfire episodes, these fire reports do highlight the potential for increased severity caused by blowdown material. On a smaller scale, an 8-acre lightning-caused wildfire, the Taggarts Creek incident, occurred in recent blowdown on BLM land east of Shady Cove. Blowdown blocking roads to the incident hampered access to the wildfire as well as access to nearby water sources.

A Firefighting crew hiked into the fire to attempt the construction of firelines with handtools; however, they were unable to construct firelines due to the size of blowdown trees and consideration for firefighter safety. A dozer was brought in to clear the access road and assist with fire suppression efforts. The fire was about one acre when it was first detected, and grew to about 5 acres before the dozer reached the fire. Water drops from a helicopter were used in an effort to keep the fire from spreading until the dozer could reach the fire; however, they were ineffective due to the heavy fuel created by the blowdown. Efforts to construct dozer firelines were also hampered. For a typical fire incident, located in timbered forest, it would normally take about one hour for an experienced dozer operator to construct a fireline around a five to eight acre fire. Due to the heavy blowdown, a second dozer was ordered. For the Taggarts Creek incident, it took two D6 dozers and three firefighters with chainsaws (to cut the trees ahead of the dozers) five hours to construct line around the fire. The amount of blowdown has also increased the amount of time for fire mop-up efforts (Smith 2008). The Taggarts Creek incident is an example of how blowdown can increase the complexity and safety hazards for wildfire suppression efforts.

Over the long-term (about 10 to 15 years), as young trees begin to establish and grow beneath the residual stand, the flammability of untreated units would continue to increase. This combined with moderate and high fire hazard fuels conditions in other forest stands in the Soda Creek drainage could contribute to the potential for large scale high severity wildfire.

Other areas scattered throughout the Soda Creek drainage are proposed for thinning and subsequent fuels reduction (including follow-up maintenance underburning) in association with the South Fork Little Butte Project. If the reasonably foreseeable South Fork Little Butte Project is implemented it could serve to break up the continuity of high hazard fuels on the landscape scale in and could help to offset difficult fire suppression capabilities at the site scale in the untreated Windy Soda units.

Under Alternative 2, heavy fuels would be removed from the Windy Soda project area. The distribution of blow down trees and associated slash is patchy in nature, therefore, it is anticipated that 50 to 70 percent of the 413-acre project area would be treated. Of the 413 acres, small diameter slash (tops and limbs, 1-3 inch diameter) created from blown down trees would be hand-piled and burned on 145 acres, reducing the fuel loading to that of a fuel model 8 (light timber litter). The remaining 188 to 268 acres of Windy Soda units would have the small diameter fuels lopped and scattered. While this leaves more surface fuel than hand piling and burning units, the fuel loading in these areas is less concentrated. Lopping and scattering changes the fuel arrangement by reducing the vertical height and fuel bed continuity. This practice also increases the amount of fuel in contact with the ground, which increases fuel moisture and the decomposition rate. Over all the rate and intensity of fire spread created by the short-term increase in small diameter fuels generated by the blowdown would be reduced to pre-existing levels after a 2 to 4 year period. With the concentrated areas of large diameter heavy fuels removed, in the event of a wildfire, fire suppression would be less complex, direct fire suppression versus indirect fire suppression would likely be the norm.

Thinning and fuels reduction, associated with the South Fork Little Butte project, is also reasonably foreseeable. Over the long-term (about 10 to 15 years), the Windy Soda project units would begin to increase in flammability and decrease in fire resiliency as young trees begin to establish and grow beneath the remaining overstory. However, there would be a reduced amount of heavy (large diameter) fuels in comparison to the no-action alternative. Forest thinning and subsequent fuels reduction (including follow-up maintenance underburning) in association with the South Fork Little Butte project would act to break up the continuity of high hazard fuels on the landscape scale.

7. How does the timing of timber salvage affect the quantity and value of the timber removed?

The purpose of the Windy Soda Project is to salvage blowdown timber from matrix lands allocated to produce a sustainable supply of timber while contributing towards the District's Allowable Sale Quantity. Timber volume in the Windy Soda Salvage project is estimated to be about 0.8 to 1 million board feet. In

order to maximize the benefit of the salvage in terms of total volume and value, prompt removal and manufacture is imperative. Research has shown that deterioration of timber following a wind event begins quickly, with damage resulting from stain fungi, wood boring insects, sapwood decay, and defects due to drying and checking. Log decay rates vary by species (i.e., percent of sapwood vs. heartwood), by aspect on the landscape, moisture content of the sapwood at the time of the event, humidity around the downed timber, and log size. (Smaller diameter timber deteriorates faster on a percentage basis than larger diameter timber). Thus, it is difficult to apply precise decay rates to the Windy Soda volume due to the species mix, aspect differences, and variations in the amount of vegetative cover and shade over the downed timber, but average volume losses are estimated to be approximately 10% after two years and 25% after four years. (Aho and Cahill, USDA, PNW, 1984).

Log grade and thus value are also affected by the timing of salvage. Ponderosa pine is affected by a blue stain fungus which doesn't affect the volume, but begins to devalue wood value within the first year. Checks and splits result in log scale deductions and loss of value because surface grade and structural grades are not tolerant of those defects, so logs with such defects are subject to grading rules which result in lower grades and value. Studies in the Blue Mountains of Oregon *Parry et al*, 1997, have shown that value of dead Douglas-fir is reduced approximately 44% after two years. Prompt removal of the blowdown timber would result in the greatest return to the federal treasury.

8. What is the potential for impacts to wildlife?

The severity of the blowdown is irregular over the landscape – it ranges from a few trees per acre to practically all trees blown down in some areas. The most severely affected areas were units that had been harvested under the Indian Soda timber sale. The blowdown in the units that will be salvaged consist primarily of Douglas fir, ponderosa pine, and a variety of hardwood trees. Only the conifers will be removed in the salvage operation. The density of standing trees varies by unit, but generally canopy closure is sparse, and shrubs have not recovered from the previous logging operations.

As a component of wildlife habitat, down wood serves as sites for breeding, feeding and sheltering for many wildlife species. Approximately 150 wildlife species in western Oregon and Washington use down wood as a primary or secondary component of their habitat requirements (Brown 1985). Down wood/logs are classified in a 5-class system based on the degree of decomposition. Class 1 logs have recently fallen and Class 5 logs have been down for many years and are nearly completely decomposed (Brown 1985). All logs to be removed in the Windy Soda sale are rated as Class 1.

The species of special concern for this project are recognized in two categories; Special Status Species, and Birds of Conservation Concern (including Game Birds Below Desired Condition).

Threatened/ Endangered (T&E) and Special Status Species (SSS) Wildlife Species.

Species are recognized as "special status" if they are federally listed as threatened or endangered, proposed or a candidate for federal listing as threatened or endangered, or if they are a BLM sensitive species. BLM policy is to manage for the conservation of these species and their habitat so as not to contribute to the need to list additional species, and to recover listed species. Special Status Species known or likely to be present in or adjacent (within ¼ mile) to the project area, and that could be affected by the removal of Class 1 logs are displayed in Table 3-9.

Table 3-9: Special Status Species (Terrestrial Wildlife)

Species	Status
Lewis' Woodpecker (<i>Melanerpes lewis</i>)	BS
Northern Spotted Owl (<i>Strix occidentalis caurina</i>)	FT
Fisher (<i>Martes pennanti</i>)	BS

Bureau Sensitive = BS

Federal Threatened = FT

Lewis' Woodpecker

Lewis' Woodpecker primarily winters in Jackson County but there is some limited nesting (Marshall et al. 2003). Potential nesting trees (soft snags) would not be removed in the proposed action area unless they present a hazard to workers. Also, Brown (1985) lists this woodpecker as a forager on Class 1 logs. The removal of Class 1 logs would reduce potential foraging opportunities for this species; however, the project design feature for retaining 120 linear feet of logs greater than 16 inches in diameter would mitigate this potential impact.

Northern Spotted Owl/Northern Spotted Owl Critical Habitat

It is unlikely that owls would use any of the Windy Soda units for nesting, roosting, foraging, or dispersal due to the lack of canopy closure; high to moderate canopy closure is an element of spotted owl habitat. Future foraging habitat, however, could be influenced by the amount of coarse woody material on the forest floor since some spotted owl prey species (small mammals) are associated with down wood. The removal of windblown trees would remove some of this habitat, but the project design feature for down wood retention should provide for adequate cover for small mammals as the forest develops.

Some units have unsurveyed suitable habitat adjacent to them, and harvest operations in these units during the critical nesting period for spotted owls (March 1 – June 30) could affect nesting success through disturbance. Logging operations would be restricted within 195 feet of the unsurveyed suitable habitat during the critical nesting period.

The proposed project is in Northern Spotted Owl Critical Habitat Unit OR-37. The project would not remove any of the constituent elements of critical habitat, i.e., nesting, roosting, foraging and dispersal habitat, but the removal of some of the downed trees could impact the potential of future foraging habitat as described above. Again, the down wood retention project design feature would mitigate this potential impact.

Fisher

Fisher are not known to be present in the project area, but there is a verified sighting approximately 5 miles from the proposed project area. With a sighting that close, fisher could be present in the proposed project area. Fisher use Class 1 down logs for cover, foraging, and resting (Brown 1985). Some Class 1 logs would be removed by the proposed action, but adequate numbers would remain as a result of implementation of the project design feature for down wood retention.

Birds of Conservation Concern

BLM has issued interim guidance for meeting BLM's responsibilities under the Migratory Bird Treaty Act and Executive Order (EO) 13186. Both the Act and the EO promote the conservation of migratory bird populations. The interim guidance was transmitted through Instruction Memorandum (IM) No. 2008-050. The IM relies on two lists prepared by the U.S. Fish and Wildlife Service in determining which species are to receive special attention in land management activities; the lists are *Bird Species of Conservation Concern* (BCC) found in various Bird Conservation Regions and *Game Birds Below Desired Condition* (GBBDC). Table 3-10 displays those species that are known or likely to be present in the project area and could be affected by the removal of Class 1 logs.

Table 3-10: Bird Species of Conservation Concern

Species	Status
Lewis' Woodpecker (<i>Melanerpes lewis</i>)	BCC
Northern Spotted Owl (<i>Strix occidentalis caurina</i>)	BCC
Northern Goshawk (<i>Accipiter gentilis</i>)	BCC

Lewis' Woodpecker

See discussion above under the SSS heading.

Northern Spotted Owl

See discussion above under the SSS heading.

Northern Goshawk

The units to be salvaged were previously harvested and do not provide suitable habitat for the Northern Goshawk. As with the Northern Spotted Owl, the removal of Class 1 logs could affect the future prey base for the Northern Goshawk as the forest develops. The down wood retention project design feature should mitigate impacts to future prey species habitat.

Cumulative Effects

The silvicultural prescription for the 2000-2003 projects in the Little Butte Creek Watershed (BLM 2000) indicates that down woody material is generally below the levels recommended by White (2001) for the Plant Association Groups in the Soda Creek drainage where this proposed project would take place. The Windy Soda salvage sale would leave a minimum of 120 lineal feet of 16 inch by 16 foot Class 1 logs as required by the Medford District Resource Management Plan. Down wood requirements for other projects in this drainage would be the same. Over time, down woody material objectives should trend toward meeting the levels recommended by White (2001), which is approximately 9-10 tons per acre in varying classes of decay.

9. What is the potential for impacts to botanical resources?

Bureau Special Status Plants, Lichens, and Fungi (SSP) include species that are listed as threatened or endangered under the Endangered Species Act (ESA), proposed or candidates for listing, State listed, and Bureau designated Sensitive species. For these species, the BLM implements recovery plans, conservation strategies, and approved project design criteria of biological opinions, and ensures that actions authorized, funded, or carried out by the BLM do not contribute to the need for the species to become listed.

On July 25, 2007, the Survey and Manage requirements were removed from the Resource Management Plans of nine BLM Districts (including Medford's) through the Record of Decision To Remove the Survey and Manage Mitigation Measure Standards and Guidelines from Bureau of Land Management Resource Management Plans Within the Range of the Northern Spotted Owl (July 2007 ROD). Conservation of rare and little known species is provided for by the BLM's, and other Agency's, Special Status Species Programs, elements of the Northwest Forest Plan, the underlying land and resource management plans, and relevant agency programs and policies.

On July 25, 2007, the Oregon State Office Instruction Memorandum No. OR-2007-072 updated the State Director's Special Status Species List to incorporate the July 2007 ROD and to include species additions and deletions from the application of the most recent scientific data. This list was finalized with the February 6, 2008 Instruction Memorandum No. OR-2008-038.

Of the four federal endangered (*Arabis macdonaldiana*, *Fritillaria gentneri*, *Limnanthes floccosa* ssp. *grandiflora*, *Lomatium cookii*) and one candidate (*Calochortus persistens*) plants on the Medford District, the Windy Soda Project Area is within the range of none. No occurrences of listed or candidate plants have been found within the project area. Any sites of listed or candidate plants found outside their defined range would have been reported.

Surveys for all species, except fungi, on the Medford District SSP list were conducted in 1998 (vascular plants) and 2008 (nonvascular plants and lichens) in association with this and other projects. Surveys

were conducted using the intuitive controlled survey method (see definitions). The surveys found no occurrences of Bureau SSP species within or adjacent to the Windy Soda proposed treatment areas.

Of the 20 species of fungi that are on the Medford District SSP list, 17 are former Survey and Manage (S&M) Category B species whose status determined that pre-disturbance surveys were impractical and not required. Two of the 20 fungi species are former S&M Category E or F where their S&M status was undetermined and pre-disturbance surveys were not required. One species of the 20 fungi is not a former S&M species but is a hypogeous (underground) fungus, as are other of the previously referenced fungi where pre-disturbance surveys were impractical (see Table 3-11). Oregon State Office Information Bulletin No. OR-2004-145 reaffirmed that these surveys were impractical and further, stated that Bureau policy (Manual Section 6840) would be met by known site protection and large-scale inventory work (strategic surveys) through fiscal year 2004.

Table 3-11. Sensitive Fungi with Suitable Habitat within the Windy Soda Project Area

Scientific Name	Former S&M	ORNHIC Rank	ORNHIC List	NWFP Sites
<i>Boletus pulcherrimus</i>	B	G2G3/S2	1	44
<i>Dermocybe humboldtensis</i>	B	G1G2/S1	1	4
<i>Gastroboletus vividus</i>	B	G2?/S1	1	5
<i>Gomphus kauffmanii</i>	E	G2G4/S3?	3	72
<i>Gymnomycetes fragrans</i>	B	G2G3/S1S3	1	2
<i>Helvella crassitunicata</i>	B	G3/S2	2	27
<i>Leucogaster citrinus</i>	B	G3G4/S3S4	3	46
<i>Otidea smithii</i>	B	G2/S2	3	10
<i>Phaeocollybia californica</i>	B	G2?/S2?	1	38
<i>Phaeocollybia olivacea</i>	F	n/a	n/a	110
<i>Phaeocollybia oregonensis</i>	B	G2?/S2?	1	14
<i>Phaeocollybia pseudofestiva</i>	B	G3/S3?	3	47
<i>Pseudorhizina californica</i>	B	G4/S2	2	42
<i>Ramaria largentii</i>	B	G3/S2?	3	20
<i>Ramaria spinulosa</i> var. <i>diminutiva</i>	B	GUT2/S1?	1	1
<i>Rhizopogon chamaleontinus</i>	B	G2G3/S1S2	2	1
<i>Rhizopogon clavitisporus</i>	-	G2G3/S1S2	2	4
<i>Rhizopogon ellipsosporus</i>	B	G2G3/S1S2	2	5
<i>Rhizopogon exiguus</i>	B	G2G3/S1S2	2	3
<i>Sowerbyella rhenana</i>	B	G3G4/S3	3	64

S&M = Survey and Manage Category

ORNHIC = Oregon Natural Heritage Information Center

G = Global Rank

S = State Rank

Rank Definitions:

1 = Critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrences.

2 = Imperiled because of rarity or because other factors demonstrably make it very vulnerable to extinction (extirpation), typically with 6-20 occurrences.

3 = Rare, uncommon, or threatened but not immediately imperiled, typically with 21-100 occurrences.

4 = Not rare and apparently secure but with cause for long-term concern, usually with more than 100 occurrences.

5 = Demonstrably widespread, abundant, and secure.

? = Not yet ranked or assigned rank is uncertain.

U = Unknown rank.

List Definitions:

1 = taxa which are endangered or threatened throughout their range or which are presumed extinct

2 = taxa which are threatened, endangered or possibly extirpated from Oregon, but are stable or more common elsewhere.

3 = taxa for which more information is needed before status can be determined, but which may be threatened or endangered in Oregon or throughout their range.

Special Status Plants and Lichens within or adjacent to treatment units

None.

Sensitive Fungi with suitable habitat within the project area

Boletus pulcherrimus is the red-pored bolete mushroom. It is listed as endemic to the Pacific Northwest, including northern California, but has also been reported from New Mexico. In the range of the NFP, there are 44 known sites. Within the boundary of the Medford District, four sites are on BLM in the vicinity of Hyatt and Howard Prairie Lakes, one is on the Rogue River National Forest, and one is on private land near Shale City. One other Rogue River National Forest site and six Winema National Forest sites border the Medford District. All four Medford District sites are located in the Jenny Creek fifth field watershed. None of these sites are located within the project area; the nearest site is approximately 4.4 air miles away. NFP habitat data is available for only the Medford and Winema sites. Plant community data shows this species occurs on White fir/Douglas-fir early mature forests, Douglas-fir/White fir/Ponderosa pine young forest, White fir/chinquapin communities, and Shasta red fir/chinquapin communities. Elevation ranges from 4,620 to 5,640 feet. Habitat data for other NFP sites is in humus in association with roots of mixed conifers (Grand fir, Douglas-fir) and hardwoods (tanoak) in coastal forests. It is also associated with bigleaf maple, and vine maple. This species is a mycorrhizal fungus dependent on the health of its symbiotic partnership with mixed conifers.

Dermocybe humboldtensis is a green-brown cap mushroom with olive-yellow gills. It is endemic to California and Oregon. In the range of the NFP, there are four known sites. The nearest two sites occur on the BLM Roseburg District approximately 63.4 air miles away from the project area. Habitat data for the Roseburg sites is incomplete; community type is listed as Ponderosa Pine-Douglas-fir for one site. Other NFP habitat data lists suitable community types as coastal dune Redwood/Douglas-fir and Redwood/Sitka spruce. This species is an ectomycorrhizal fungus dependent on the health of its symbiotic partnership with species in the genus *Pinus*.

Gastroboletus vividus is a bright yellow and red bolete mushroom that is formed beneath the soil surface. It is endemic to California and Oregon. In the range of the NFP, there are five known sites; one site occurs on the Rogue River National Forest. Nearest site to the project area is in the Applegate Ranger District and is approximately 26.7 air miles away. Habitat data reports an association with various Pinaceae, particularly red fir and mountain hemlock.

Gomphus kauffmanii is a tan-colored false chanterelle. It is endemic to western North America being found in Oregon, Washington, California, Idaho, and British Columbia. In the range of the NFP, there are 72 known sites with four sites occurring on the Medford District. The site nearest to the project area is 14.7 air miles away on the Winema National Forest near Lake of the Woods. This site is in an ecotone of true fir to lodgepole/hardwood forest types. This species is an ectomycorrhizal fungus dependent on the health of its symbiotic partner, presumed to be *Abies* or *Tsuga*. It is also associated with Pacific silver fir, subalpine fir, Shasta red fir, Noble fir, lodgepole pine, Douglas fir, Pacific yew, western red cedar, western hemlock, mountain hemlock, Pacific dogwood, oak species, vine maple, chinquapin, salal, and huckleberry.

Gymnomyces fragrans is a pale cinnamon brown false truffle. It is known from only six collections in Oregon, California, and Idaho. In the range of the NFP, there are two known sites with one site occurring within the boundary of the Medford District on Forest Service land. The site nearest to the project area is 26.7 air miles away on Rogue River-Siskiyou National Forest land in the vicinity of Dutchman Peak. This species is a mycorrhizal fungus dependent on the health of its symbiotic partnership with Douglas-fir and mountain hemlock, especially of middle elevation Douglas-fir forests.

Helvella crassitunicata is often found in moderately high elevations in the true fir and mountain hemlock zones, and in drier or at least well-drained sites. This species seems to tolerate mild disturbance such as well-established hiking paths but not large-scale disturbance such as logging, mining, and construction.

There are 28 sites in the range of the NFP with the nearest known site documented south of Williams, Oregon in Josephine County on BLM land 39.1 air miles away. This Josephine County site is located under a California black oak

Leucogaster citrinus is a pale to dark yellow false truffle. It is endemic to the Pacific Northwest. In the range of the NFP, there are 46 known sites with one site occurring on the Medford District. The site nearest to the project area is 4.7 air miles away in the vicinity of the Dead Indian Summit. This site is in a white fir forest with western white pine. The species is a mycorrhizal fungus dependent on the health of its symbiotic partnership with white fir, subalpine fir, lodgepole pine, western white pine, Douglas-fir, and western hemlock and seems to be abundant in lower elevation Douglas-fir forests. Other associated trees and woody species include Pacific silver fir, grand fir, mountain hemlock, tanoak, California laurel, vine maple, pinemat manzanita, Oregon grape, salal, rhododendron, salmonberry, and huckleberry.

Otidea smithii is a deep purple brown cup fungus. It is known from Washington, Oregon, and northern California with some reports from Idaho and British Columbia. In the range of the NFP, there are ten known sites with one site occurring within the Medford District boundary but on Forest Service land. The site nearest the project area is 35.4 air miles away on Rogue River-Siskiyou National Forest land in the vicinity of Applegate Lake. This site is in a Ponderosa pine-Douglas-fir association with poison oak as the dominant understory shrub at an elevation of 2300 feet. This fungus is a saprobe on forest litter under Douglas-fir, western hemlock, ponderosa pine, bigleaf maple, Oregon white oak, and black cottonwood. It may also form a symbiotic association with the fine root systems of certain plants. Other woody associates include vine maple, Oregon grape, twinflower, honeysuckle, poison oak, and *Rubus* species.

Phaeocollybia californica is an orange-brown gilled mushroom with a long pseudorhiza. It is endemic to the Pacific Northwest. In the range of the NFP, there are 38 known sites. There are two sites occurring on the Medford District. The site nearest the project area is approximately 48.8 air miles away in the vicinity of Wilderville. The plant association reported for this site is Douglas-fir-California black oak/poison oak. Other NFP habitat data shows this species is associated with Douglas-fir, western hemlock, and tanoak communities. Other habitat data reports additional associations with Pacific silver fir, Sitka spruce and redwood.

Phaeocollybia olivacea is a dark olive, glutinous, gilled mushroom with a long pseudorhiza. It is endemic to Washington, Oregon, and northern California. There are 110 known sites in the NFP area and an additional four sites outside the NFP area. Nine sites are within the Medford District boundary with the site nearest the project area being approximately 42.4 air miles away in the vicinity of Grants Pass. Medford District habitat data shows an association with Douglas-fir and Port Orford cedar. Other habitat data reports additional associations with western hemlock, redwood, Sitka spruce, tanoak, white fir, and mixed conifer forests with Fagaceae and Pinaceae. Elevation ranges from sea level to 3060'.

Phaeocollybia oregonensis is a gray-brown, glutinous, gilled mushroom with a long pseudorhiza. In the range of the NFP, it is known only from 15 sites in Oregon. The site nearest the project area is approximately 82 air miles away on the BLM Coos Bay District. Habitat data reports an association with Douglas-fir, western hemlock, and Pacific silver fir. It has been reported from late successional forests but has also been reported from a 30 year old Douglas-fir plantation. Elevation ranges from 550' to 4056'.

Phaeocollybia pseudofestiva is a dark to olive green, glutinous, gilled mushroom with a long pseudorhiza. It is endemic to western North America occurring in British Columbia, Washington, Oregon, and northern California. There are 47 sites in the GeoBOB database. Four sites are within the Medford District boundary with the site nearest the project area being approximately 42.3 air miles away in the vicinity of Grants Pass. Medford District habitat data for one site near Lake Selmac has the site located in a Tanoak-Douglas-fir-Canyon live oak forest. The other two Medford District sites are also valley bottom sites, Blue gulch which is west of Grants Pass and Reeves creek north of Kerby. Other habitat data reports a mycorrhizal association with species of Pinaceae, mixed conifers and hardwoods.

Pseudorhizina californica is an olive-brown to grey-brown false morel. It is endemic to western North America occurring in British Columbia, Washington, Oregon, California, Idaho, western Montana, and western Wyoming. There are 42 sites in the GeoBOB database. There are two known sites occurring within the Medford District boundary but on Forest Service land. The site nearest the project area is 13.8 air miles away on Winema National Forest land in the vicinity of Lake-of-the-Woods. This fungus is found fruiting on or adjacent to well-rotted stumps or logs of coniferous trees or on soil rich in brown rotted wood.

Ramaria largentii is a pale orange to deep orange coral mushroom. It is endemic to the Pacific Northwest (Washington, Oregon, and northern California). There are 20 known sites in the GeoBOB database. Two sites are on the Medford District. The site nearest the project area is 5.0 air miles away near the Howard Prairie Lake Resort. It was discovered in 1998 by a regional survey team. This is an ectomycorrhizal species that depends on forest components of Douglas-fir, western hemlock, western white pine, or true firs. This species has been found in young to mature Douglas-fir forests.

Ramaria spinulosa var. *diminutiva* is a brown coral fungus known from only one site in the range of the NFP. It is also known from Europe. The single Oregon site is in the BLM Roseburg District in a late successional Douglas-fir forest at 1200' elevation. This site is approximately 61.8 air miles from the project area and is southeast of Roseburg. Other habitat data reports an association with Pinaceae.

Rhizopogon chamaleontinus is a white globose underground truffle fungus. It is known from one site in the range of the NFP but is also known from Idaho. The single NFP site is within the Medford District boundary but mapped on Oregon Department of Forestry land near Galice. The site is approximately 57.7 air miles from the project area. There are no sites located in the Little Butte Creek or Jenny Creek watersheds. Habitat data for this site is Douglas-fir forest at 3300' elevation.

Rhizopogon clavitisporus is an underground truffle fungus with little published information. The Oregon Natural Heritage Information Center tracks three sites within the range of the NFP. There is also one known site in Idaho. The ecology and biology of this species is unknown and requires further research. One site is within the boundary of the Medford District and is closest to the project area being 31.0 air miles away in the vicinity of McKee Bridge. The habitat at this site is Douglas-fir and Ponderosa pine forest. Other habitat data includes forests of Douglas-fir, lodgepole pine, Englemann spruce, and subalpine spruce. This species is an ectomycorrhizal fungus dependent on the health of its presumed symbiotic partnership with members of the Pinaceae family.

Rhizopogon ellipsosporus is a brown subglobose underground truffle fungus. It is known from only five sites in the NFP area; four within the Medford District boundary and one in the northern Oregon Cascades. The nearest site is approximately 28.5 air miles from the project area near Cantrall-Buckley Park. Habitat data lists an association with Douglas-fir and Sugar Pine.

Rhizopogon exiguus is a white mottled globose underground truffle fungus. It is endemic to Oregon with only three sites known in the NFP area. The nearest site is within the boundary of the Medford District but located on Siskiyou National Forest land. It is approximately 45.6 miles away in the vicinity of Waters Creek near Wonder, Oregon. The elevation of this site is 2,800 feet. Habitat data lists an association with Douglas-fir and western hemlock.

Sowerbyella rhenana is a bright orange to yellow-orange stalked cup fungus. It is known from 64 sites in Washington, Oregon, and California. It is also found in Europe and Japan. There are 13 sites on the BLM Medford District. The site nearest the project area is 3.8 air miles away in the vicinity of Chimney Rock. The forest type is mixed conifer-hardwood with the dominant species of Ponderosa pine and Douglas-fir. The understory and forb layer is sparse. It is 10 meters from the edge of an oak-chaparral forest type. The elevation of this site is 2,900 feet. The general habitat description is moist, relatively undisturbed, older conifer forests.

Noxious Weeds and Introduced Plants

Noxious weeds are generally nonnative plants that cause or are likely to cause economic or environmental harm or harm to human health. Introduced plants are species that are nonnative to the ecosystem under consideration. Introduced plants may adversely affect the proper functioning condition of the ecosystem.

Weed surveys were done as part of a larger project in 1998. Noxious weeds are found throughout the project area and adjacent private lands. Noxious weed populations in the project area are small, low density, and mostly associated with roads (a common pathway for weed introduction and spread). All species of noxious weeds in the project area are on the Oregon Department of Agriculture List B. “B” designated weeds are weeds of economic importance which are regionally abundant but may have limited distribution in some counties. One species (*Centaurea solstitialis*) is also a T list weed. “T” list weeds are target species for which the Oregon Department of Agriculture will develop and implement a statewide management plan.

Table 3-12. Noxious weeds and Introduced plants within the Windy Soda Project Area.

Scientific Name	Common Name	ODA List*
<i>Aira caryophylla</i>	silver hairgrass	
<i>Arrhenatherum elatius</i>	tall oatgrass	
<i>Avena fatua</i>	wild oat	
<i>Bromus diandrus</i>	ripgut brome	
<i>Bromus hordaceus</i>	soft brome	
<i>Bromus tectorum</i>	cheatgrass	
<i>Centaurea solstitialis</i>	yellow star-thistle	B/T
<i>Cichorium intybus</i>	chicory	
<i>Cirsium arvense</i>	Canada thistle	B
<i>Cirsium vulgare</i>	bull thistle	B
<i>Cynosurus echinatus</i>	bristly dogstail grass	
<i>Dactylis glomerata</i>	orchardgrass	
<i>Daucus carota</i>	Queen Anne’s lace	
<i>Dipsacus fullonum</i>	Fuller’s teasel	
<i>Erodium cicutarium</i>	redstem stork’s bill	
<i>Geranium molle</i>	dovefoot geranium	
<i>Holcus lanatus</i>	common velvetgrass	
<i>Hypericum perforatum</i>	common St. Johnswort	B
<i>Hypochaeris radicata</i>	hairy catsear	
<i>Lactuca serriola</i>	prickly lettuce	
<i>Leucanthemum vulgare</i>	oxeye daisy	
<i>Lotus corniculatus</i>	birdfoot deervetch	
<i>Myosotis discolor</i>	changing forget-me-not	
<i>Phleum pratense</i>	timothy	
<i>Plantago lanceolata</i>	narrowleaf plantain	
<i>Poa bulbosa</i>	bulbous bluegrass	
<i>Poa compressa</i>	Canada bluegrass	
<i>Poa pratensis</i>	Kentucky bluegrass	

<i>Rubus discolor</i>	Himalayan blackberry	B
<i>Rubus laciniatus</i>	cutleaf blackberry	
<i>Rumex acetosela</i>	garden sorrel	
<i>Rumex crispus</i>	curly dock	
<i>Taeniatherum caput-medusa</i>	medusahead	B
<i>Taraxacum officinale</i>	common dandelion	
<i>Torilis arvensis</i>	spreading hedgeparsley	
<i>Tragopogon dubius</i>	yellow salsify	
<i>Tragopogon pratensis</i>	meadow salsify	
<i>Trifolium dubium</i>	suckling clover	
<i>Trifolium repens</i>	white clover	
<i>Verbascum blatteria</i>	moth mullein	
<i>Verbascum thapsis</i>	common mullein	
<i>Vicia sativa</i>	garden vetch	
<i>Vulpia myuros</i>	rat-tail fescue	

Alternative 1 – No Action Special Status Plants, Sensitive Fungi, Noxious Weeds and introduced plants

Without the harvest of windthrown trees, there would be more down coarse woody debris and no soil disturbance from salvage operations. Alternative 1 would not disturb soils which would favor plants, lichens, and fungi, and also does not contribute to the spread of noxious weeds. Weed populations would be limited to existing weed sites and spread into adjacent areas. New weed establishments would be limited to existing disturbed areas and areas of open canopy.

The increased ground fuels could help carry a wildfire that would burn more severe where blowdown occurs. Although because blowdown is not uniformly distributed, blowdown is more concentrated in some areas than others, the areas burned at higher intensity would be “patchy.” While some individuals of Special Status Species could be lost (none are known in the project area) this pattern of vegetation favors biodiversity. However, disturbance by fire would also open areas up for weed establishment.

In some areas, the potential remains for a stand replacement fire that would produce early seral habitat conditions that are also favorable for weed invasion. While a few rare plants can be found in disturbed habitats, such as burned areas, they are also found in natural habitats, such as forest openings or woodlands. In these disturbed habitats, competition for resources from noxious weeds and invasive nonnative plants would normally preclude rare plant survival.

Noxious weed inventory and treatment would occur per BLM, Ashland Resource Area strategy. Treatments are scheduled by priority and occur based on the potential of the weed population to cause economic or environmental harm or harm to human health and as funding is available. If Roadside populations are not treated in the short term they would continue to spread.

Alternative 2-Special Status Plants, Sensitive Fungi, Noxious Weeds and introduced plants

Since there are no known sites of Special Status Plants, Lichens, or Fungi, there would be no direct effects to these species. The harvest of windthrown trees would produce more soil disturbance and could potentially increase the area compacted, although analysis of effects to soils and water resource anticipates only a slight increase in the area compacted due to the requirement for using predesignated skid trails and the use of existing skid trails to the extent practical (see Chapter 2, Project Design Features, and Chapter 3, Soil and Water Resource Sections). Any new areas of soil compaction would degrade habitat conditions for native plants and fungi that occur in the project area. Ground disturbance would favor noxious weeds and introduced plants.

While the treatment of logging slash would reduce the risk of wildfire, the disturbance by fire would open areas to weed establishment. However, pile burn areas only affect 3 to 5 percent (see Soil Section above) of the area treated. Because fuels created from blowdown would be treated, the area would be less prone to wildfire and subsequent weed invasion in comparison to Alternative 1.

Salvaging blowdown trees would not affect forest vegetation composition and structure in relationship to Special Status Plants, Lichens, or Fungi habitats, and therefore, would have no contribution to adverse cumulative effects when considering other reasonably foreseeable timber harvest projects in the vicinity of the Windy Soda project, such as the South Fork Little Butte project.

With the implementation of the project design features, weed spread would be avoided and existing roadside weed populations would be controlled.

There are no known occurrences of the Special Status Fungi in the project area, no surveys were conducted as it has been determined that surveys are impractical. Therefore, we have no information that would cause us to find that the proposed action would have any effect on any of these 20 species.

Implementation of this project would comply with the Medford District Resource Management Plan (RMP) and Bureau Policy on Special Status Species Management, Manual Section 6840.

Other Effects:

a. Potential Effects to Public Health and Safety.

No aspects of the project have been identified as having the potential to significantly and adversely impact public health or safety. All operations on BLM-administered lands are required to meet Occupational Safety and Health Association regulations for worker and public safety.

b. Potential for Effects to Cultural Resources.

The entire Windy Soda project area was reviewed for the potential for adverse impacts to cultural resources. The area was surveyed previously in conjunction with the Indian Soda timber sale project. No sites requiring protection occur where tree salvage removal is planned in the Windy Soda Project Area. The Windy Soda Project is No Effect Determination for cultural resources.

c. Environmental Justice

This project was reviewed for the potential for disproportionately high or adverse effects on minority or low income populations. The environmental analysis conducted for the Windy Soda project did not identify any disproportionately high adverse impacts to minority or low income populations. (*Executive Order 12898 (Environmental Justice)*).

I. PUBLIC PARTICIPATION

Public notice of the availability of this EA was provided through advertisement in Medford's *Mail Tribune* newspaper. A copy of this EA is available upon request from the Ashland Resource Area, Bureau of Land Management, 3040 Biddle Rd., Medford, OR 97540, (541) 618-2384.

This EA was distributed to interested individuals and to the following agencies, organizations, and tribes:

Organizations and Agencies

Association of O&C Counties
Audubon Society
Jackson County Stockmen's Association
Jackson County Commissioners
Jackson Co. Soil and Water Conservation District
Klamath Siskiyou Wildlands Center
Northwest Environmental Defense Center
Oregon Department of Forestry
Oregon Wild
Oregon Department of Fish and Wildlife
Oregon Department of Environmental Quality
Rogue River Valley Irrigation Co.
The National Center for Conservation Science and Policy
Medford Irrigation District
Siskiyou Project
Rogue River National Forest (RRNF)
The Pacific Rivers Council
Little Butte Watershed Council
Bureau of Reclamation
Medford Water Commission
Southern Oregon University Library
Southern Oregon Timber Industries
Pacific Legal Foundation
Oregon Hunters Association

Federally Recognized Tribes

Cow Creek Band of Umpqua Indians
Confederated Tribes of Grand Ronde
Confederated Tribes of Siletz
Klamath Tribe
Quartz Valley Indian Reservation (Shasta Tribe)
Shasta Nation

Other Tribes

Confederated Bands [Shasta], Shasta Upper
Klamath Indians
Confederated Tribes of the Rogue-table Rock
and Associated Tribes

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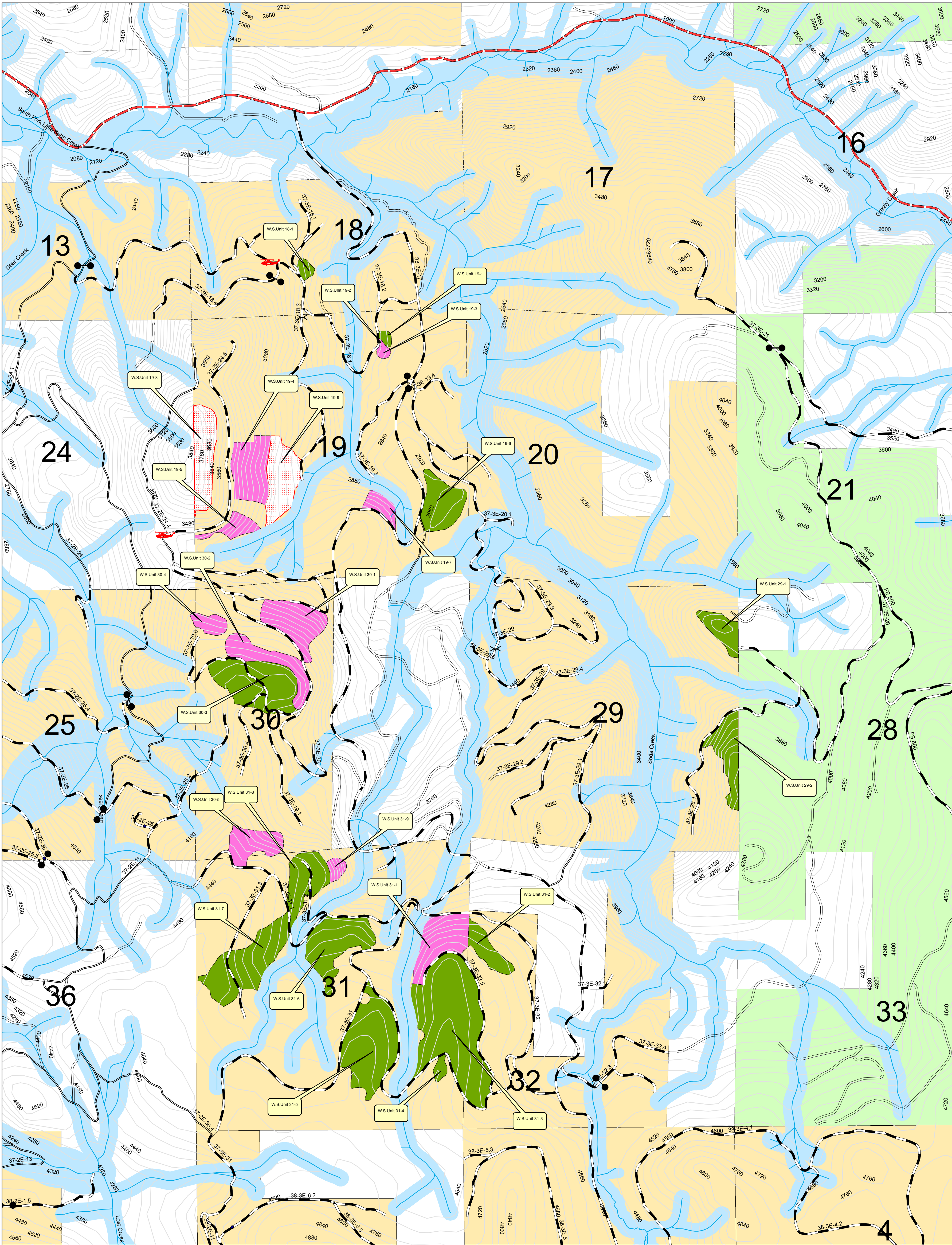
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T.37S

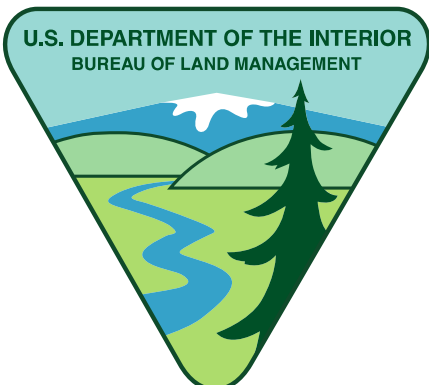
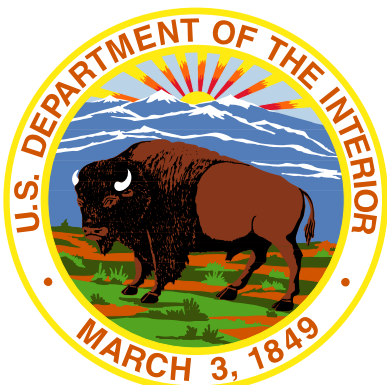
T.38S



R.2E

WINDY SODA EA (MAP 2-1)

R.3E



1:12000
07-08-08

Legend

Existing Landings

Gates

- <all other values>

CLSRDEVICE

- EBM
- GT

ownerdesg

- BLM
- CNTY
- FS
- NON-INVENTORIED
- PVT

Streams_Clip_Identity

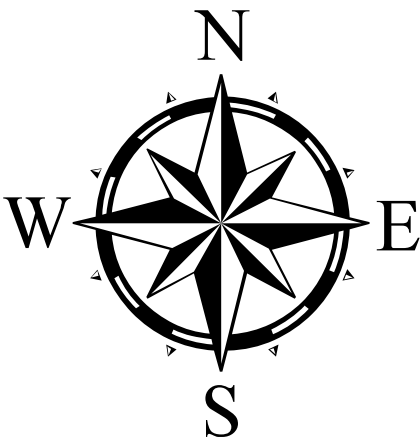
- riparian_sflb_creek
- Helicopter
- Tractor
- Cable

lli

- <all other values>

juriscode

- BL
- FS



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